LILA CANYON MINOR REVISION 007/013

CHAPTERS 7 - 8
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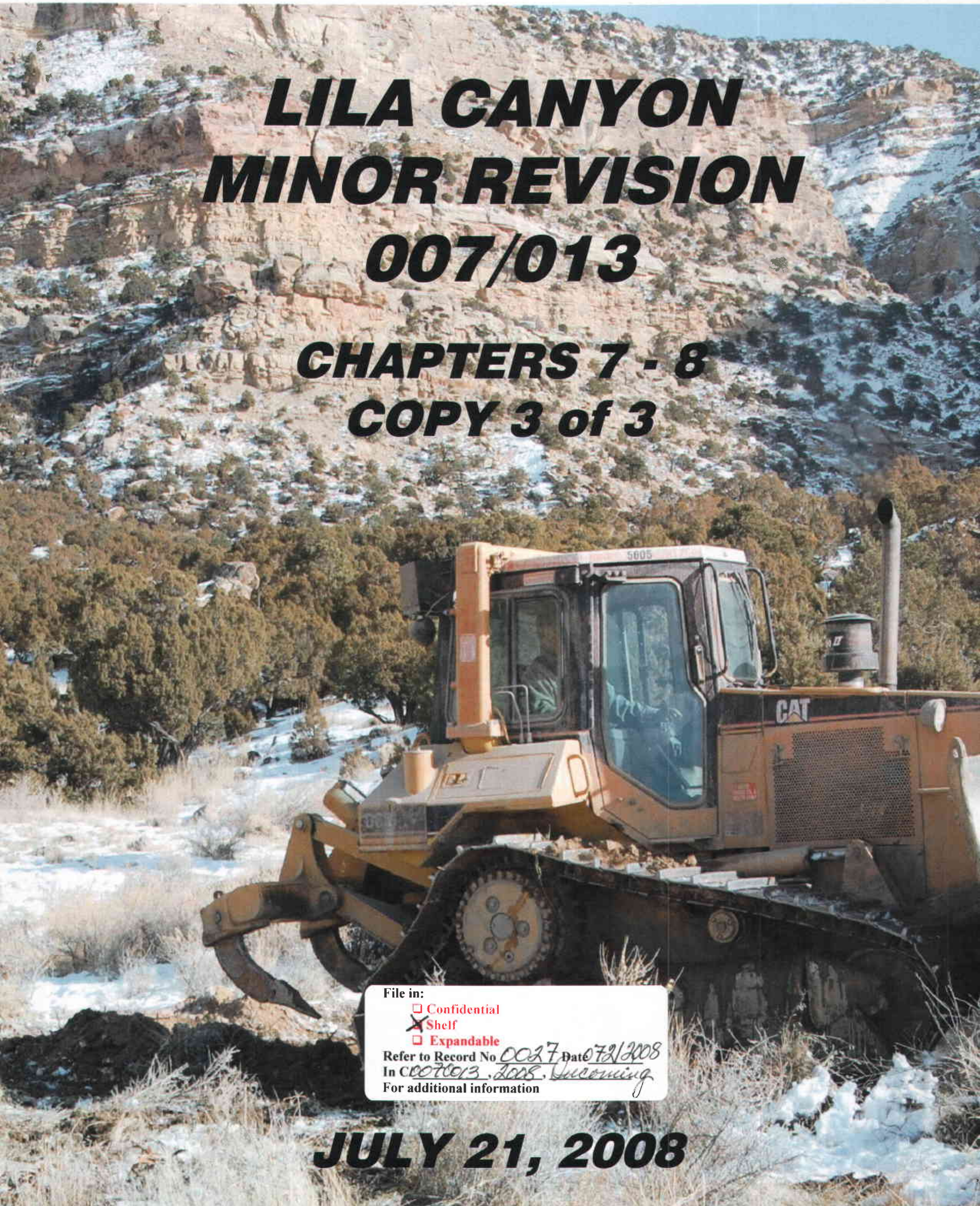

JULY 21, 2008

List of Appendices

List of Plates

List of Figures

List of Tables

Plate 7-3	Water Rights Locations
Plate 7-4	Water Monitoring Location Map
Plate 7-5	Proposed Sediment Control Map
Plate 7-6a	Proposed Sediment Pond #1
Plate 7-6b	Proposed Sediment Pond #2
Plate 7-7	Post-Mining Hydrology

All required maps and cross-sections have been prepared by, or under the supervision of, and certified by a Registered Professional Engineer, State of Utah.

731.710 General Area Hydrology Plate 7-1.

731.720 Plate 7-2.

731.730 Water Monitoring Map Plate 7-4.

731.740 Sediment Pond Map Plates 7-6a and 7-6b.

731.750 Plate 7-6a & b.

731.760 Other Maps (See Section 731.700 for a complete list of maps provided in this section).

731.800 Water Rights and Replacement (See Section 727)

732. Sediment Control Measures

732.100 Siltation Structures The only proposed siltation structure for this site is the sediment pond. All disturbed area runoff is proposed to be directed to this pond for final treatment prior to discharge.

The sediment pond will be constructed and maintained in compliance with applicable regulations. Details of the proposed pond are discussed in the following section and in Appendix 7-4.

732.200 Sedimentation Ponds As discussed above, all disturbed area runoff is proposed to be directed to a sediment pond for final treatment prior to any discharge. The proposed sediment pond will be located at the low point of the disturbed area, as shown on Plate 7-5.

732.210 Sediment Pond Details The proposed sediment pond is considered temporary, and will be removed during final reclamation. The pond is designed in compliance with the requirements of the following sections, as required:

356.300 - The pond will be maintained until the disturbed area has been stabilized and revegetated. Removal shall not be any sooner than 2 years after the last augmented seeding;

356.400 - Upon removal, the pond area will be reclaimed and reseeded according to the reclamation plan;

513.200 - N/A - The proposed sediment pond does not meet the size or other qualifying criteria of MSHA, 30 CFR 77.216(a);

763 - Refer to this regulation addressed later in this chapter.

Design details for the sediment pond and site drainage control are addressed in Appendix 7-4 of this P.A.P.

732.220 MSHA Requirements This section does not apply since there are no plans for construction of coal processing waste dams or embankments at this site. The proposed pond does not meet the size or other qualifying criteria of MSHA, 30 CFR 77.216(a).

732.300 Diversions There is one undisturbed diversion planned for this site. This diversion consists of a bypass culvert beneath the sediment pond, which will allow undisturbed runoff to bypass the site without mixing with disturbed area runoff.

Other diversions planned consist of disturbed area ditches and culverts, as shown on Plate 7-5. Design details for all diversions are provided in Appendix 7-4.

All diversions will be constructed and maintained to comply with the requirements of R645-301-742.100 and R645-301-742.300.

Details are described under those respective sections of this chapter.

732.400 Road Drainage All roads will be constructed, maintained and reconstructed to comply with R645-301-742.400. Specific information to road drainage is provided under that section of this chapter.

732.410 Alteration or Relocation of Natural Drainages There are no plans to construct roads which will require alteration or relocation of natural drainageways, other than by providing culverted crossings over ephemeral drainages. There are no plans to alter or relocate any intermittent or perennial drainages in conjunction with road construction.

Road construction and design details are provided in Chapter 5 of this P.A.P. Road drainage and culvert design details are provided in Appendix 7-4.

732.420 Culverts Culvert details are provided in Appendix 7-4. All undisturbed culvert inlets will be provided with headwall protection, consisting of inlet sections, rock or concrete.

733. Impoundments The only water impoundment proposed for this site is the sediment pond. Design details for the pond are provided in Appendix 7-4 and on Plates 7-6a &b.

733.100 General Plans The general plan for this site is to drain runoff from the disturbed area into a single sedimentation pond for treatment prior to discharge. Site drainage and design details are described in Appendix 7-4. The general plan includes the following, at a minimum:

733.110 Certification The sediment control plan and proposed sediment pond designs have been prepared and certified by a Registered Professional Engineer, State of Utah.

733.120 Maps and Cross Sections Sediment pond locations, design plans and cross sections are provided on Plates 7-5 and 7-6a & b, respectively.

733.130 Narrative A complete description of the proposed sediment pond along with volumes and design/construction details in provided in Appendix 7-4.

733.140 Survey The proposed sediment pond is not located within a potential subsidence area from past underground mining operations.

733.150 Hydrologic and Geologic Information Relevant hydrologic and geologic information for the sediment pond is provided in Appendix 7-4.

733.160 Certification Statement All proposed sediment pond structures are provided with this submittal. The structure will be constructed prior to construction of the mine site area, but not before receiving Division approval.

733.200 Permanent and Temporary Impoundments As indicated earlier, the proposed sediment pond is classed as temporary.

733.210 Design Requirements The proposed sediment pond is temporary; therefore, the pond is not designed to meet requirements of MSHA 30 CFR 77.216.

The proposed pond is not located where failure would expect to cause loss of life or serious property damage. As shown in Appendix 7-4, the proposed pond embankment will have a minimum of 3H : 1V on the inside slope and 2H : 1V on the outside. These slopes, along with the 95% compaction requirement, will ensure a static safety factor in excess of 1.3, as required.

733.220 Permanent Impoundment Section 733.220 is not applicable since the impoundment will be temporary.

733.230 Temporary Impoundment The proposed sediment pond is a temporary impoundment, and will be removed when reclamation sediment control and revegetation criteria are met, in accordance with Phase II Bond Release criteria.

733.240 Inspections/Potential Hazards As indicated under Section 515.200, if any examination or inspection shows a potential hazard exists, the person who examined the impoundment will promptly notify the Division of the finding and emergency procedures formatted for public protection and remedial action.

734. Discharge Structure All discharges from sedimentation ponds, diversions and culverts will be protected from erosion by the use of adequately sized rip-rap, concrete or other approved protection. Details for outlet protection for all drainage control structures are provided in appendix 7-4. All discharge structures have been designed according to standard engineering design procedures.

735. Disposal of Excess Spoil No excess spoil production is anticipated.

736. Coal Mine Waste Any areas designated for the disposal of coal mine waste will be constructed and maintained to comply with R645-301-746. Details are described under that section.

737. Noncoal Mine Waste Storage and final disposal of noncoal mine waste are described under section 747.

738. Temporary Casing and Sealing of Wells There are no wells proposed to be used to monitor ground water conditions associated with this permit or operation. The three Piezometers will be reclaimed according to the requirements of the Divisions's Performance Standards.

740. Design Criteria and Plans Design criteria and plans for this permit are detailed in Appendix 7-4. The following section will describe the general drainage and sediment control plan.

741. General Requirements The proposed operation is an underground mine with a relatively small surface disturbance for transportation, support and coal handling facilities. The proposed surface facilities will comprise a disturbed perimeter of approximately 42.6 acres. Access roads and utility lines will consist of approximately 10 acres of additional disturbance along a BLM Right-of-Way designated as a "Transportation Corridor".

The majority of undisturbed runoff from areas above the proposed mine site will be diverted beneath the site via an undisturbed diversion culvert.

Runoff from the disturbed mine site area will be directed to a sediment pond, designed to contain and treat the runoff from a 10 year - 24 hour precipitation event for the contributing watershed. Disturbed area runoff will be directed to the sediment pond via a combination of properly sized ditches and culverts. The general drainage control plan for the mine site is shown on Plate 7-5. The complete Drainage Design and Control Plan is provided in Appendix 7-4 of this P.A.P.

742. Sediment Control Measures See Appendix 7-4 for Sediment Control Measure details.

742.100 General Requirements

742.110 Designed/Constructed/Maintained Appropriate sediment control measures will be designed, constructed and maintained using the best technology currently available to:

742.111 "Prevent, to the extent possible, additional contributions of sediment to stream flow or to runoff outside the permit area;"

This will be accomplished by the construction of undisturbed diversions to allow most undisturbed runoff to by-pass the site and by routing all disturbed runoff to sediment ponds for treatment prior to discharge.

742.112 "Meet the effluent limitations under R645-301-751;"

Any discharge from the sediment ponds will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR Part 434.

742.113 "Minimize erosion to the extent possible:" This will be accomplished by proper routing of drainage, and by the use of energy dissipators and/or erosion protection at all sediment pond, ditch and culvert outlets and in ditches where erosive velocities are expected.

742.120 Sediment Control Measure Sediment control measures within and adjacent to the disturbed areas are detailed in Appendix 7-4. These measures include, but are not limited to:

742.121 As discussed in Appendix 7-4, runoff from the disturbed area will be captured in sediment ponds and/or treated as necessary to meet effluent limitations prior to discharge.

742.122 As discussed in Appendix 7-4, the majority of undisturbed drainage from above the mine site will be diverted via designed undisturbed diversions.

742.123 Undisturbed diversions will consist of properly designed and protected channels and/or culverts as described in Appendix 7-4.

742.124 The primary means of velocity reduction is planned to be the use of rip-rap; however, other methods such as straw dikes, check dams and/or vegetative filters may be employed during the operational or reclamation phases as determined necessary, and with Diversion approval.

742.125 There are no plans to treat runoff with chemicals. Based on extensive experience with runoff in this area, effluent requirements for discharge can normally be met by containment and settling in a sediment pond.

742.126 It is expected that water will be encountered in the underground mining; however, this water will be used for mining needs and only discharged when no further storage is available underground. Any discharge of mine water will meet applicable effluent limitations. Such water will be sampled (and treated if necessary) prior to discharge.

742.200 Siltation Structures As described in Appendix 7-4 the sediment ponds will provide for sediment removal for most of the surface facility disturbance. An alternate sediment control method of berms and silt fences will be used at the fan site, around the topsoil stockpile area, and on the slopes below the water treatment area and portal access road. The description of this alternate sediment control method is also described in Appendix 7-4. In the case of the fan site, this is necessary due to its remote location and rough terrain. In the case of the water treatment slope, due to topography, there is no way to direct the runoff to the sediment basins. Other sediment structures that might be used around the surface facilities are temporary sediment traps such as straw dikes and/or catch basins.

742.210 General Requirements Siltation structures will be designed, constructed and maintained in accordance with the following regulations.

742.211 Siltation structures will be constructed using the best technology currently available to prevent additional contributions of suspended solids and sediment to streamflow outside the permit area to the extent possible. Sediment control structures and details are discussed in Appendix 7-4.

742.212 The siltation structures (i.e. sediment ponds) will be constructed prior to any coal mining and reclamation operations. Upon construction, the ponds and any other siltation structures will be certified by a qualified registered professional engineer to be constructed as designed and approved in the reclamation plan.

742.213 The sediment ponds will be designed, constructed and maintained in accordance with all applicable regulations. See 732.200, 733.200 and Appendix 7-4 for details.

742.214 Any discharge of water from underground workings to surface waters will meet applicable effluent limitations of 751. If such water is found not to meet those requirements, the water will be treated underground prior to discharge, or passed through a siltation structure prior to leaving the permit area.

742.220 Sedimentation Ponds The sedimentation ponds will meet the following criteria:

742.221.1 The ponds will be used individually;

742.221.2 The ponds are located at the lower end of the disturbed area and out of any perennial stream (See Plate 7-5);

742.221.3 The sediment ponds will be designed, constructed and maintained to:

742.221.31 The ponds are designed to contain the runoff from a 10 year - 24 hour precipitation event for the area in addition to a minimum of 2 years of sediment storage.

742.221.32 The ponds are designed to provide a minimum of 24 hour retention of the runoff from a 10 year - 24 hour precipitation event.

742.221.33 The ponds are designed to contain the runoff from a 10 year - 24 hour precipitation event plus a minimum of 2 years of sediment storage.

742.221.34 A nonclogging dewatering devices are proved as described in Appendix 7-4.

742.221.35 This will be accomplished by proper design, construction and maintenance of the ponds as described in Appendix 7-4.

742.221.36 As discussed in Appendix 7-4, sediment will be removed when the level reaches the 2 year storage level. Since the pond is oversized, this leaves adequate room for storage of the design event.

742.221.37 The sediment ponds construction ensures against excessive settlement. See "Sediment Pond Construction Requirements" in Appendix 7-4.

742.221.38 Sediment ponds will be free of sod, large roots, frozen soil, and acid- or toxic-forming coal processing waste. See “Sediment Pond Construction Requirements” in Appendix 7-4.

742.221.39 The sediment ponds will be compacted properly. See “Sediment Pond Construction Requirements” in Appendix 7-4.

742.222 Sediment Ponds Meeting MSHA Criteria The proposed ponds do not meet the size or other qualifying criteria of MSHA, 30 CFR 77.216(a). Therefore, this section is not applicable.

742.223 Sediment Ponds Not Meeting MSHA Criteria As discussed in Appendix 7-4, the ponds will be equipped with principle spillway and emergency spillway culverts each sized to safely discharge runoff from a 25 year - 6 hour precipitation event.

742.223.1 The Principle Spillway culverts and the Emergency Spillway culverts will be corrugated, metal pipe. Each one designed to carry sustained flows.

742.223.2 N/A - See 742.223.1

742.224 N/A - See 742.223.1

742.225 N/A - No exception requested.

742.225.1 N/A

742.225.2 N/A

742.230 Other Treatment Facilities No other treatment facilities are planned for this operation. Therefore, Section 742.230 is not applicable.

742.240 Exemptions No exemptions are requested at this time; however, since this is a new proposed operation, the need for Small Area Exemptions and/or Alternate Sediment Control Areas may arise in the future.

742.300 Diversions

742.310 General Requirements

742.311 All diversions are considered temporary, and will be removed upon final reclamation.

Diversions are designed to minimize adverse impacts to the hydrologic balance within the permit and adjacent areas, to prevent material damage outside the permit area and to assure the safety of the public detailed diversion designs are presented in Appendix 7-4 of this P.A.P.

742.312 See Appendix 7-4 for diversion designs.

742.313 As indicated, all diversions for the Lila Canyon Mine are temporary, and will be removed when no longer needed. Land disturbed by removal will be reclaimed in accordance with R645-301 and R645-302. Prior to diversion removal, downstream water treatment facilities will be modified or removed. See Reclamation Hydrology Section of Appendix 7-4.

742.320 Diversion of Perennial and Intermittent Steams Section 742.320 is not applicable since there are no diversions planned for perennial or intermittent streams within the permit area.

742.330 Diversion of Miscellaneous Flows All diversions within the permit area are of miscellaneous flows.

742.331 Certain miscellaneous undisturbed flows are proposed to be diverted around the disturbed area. Other flows are diverted within the disturbed area and to the sediment ponds, as described in Appendix 7-4.

742.332 See Appendix 7-4.

742.333 All temporary diversions are designed to safely pass the peak runoff of a 10-year 6-hour event resulting in a more robust design that the required 2-year 6-hour precipitation event. See Appendix 7-4 for details.

742.400 Road Drainage

742.410 All Roads All roads are designed in accordance with requirements of 534. Drainage control for all roads is discussed in detail in Appendix 7-4. No part of any road is planned to be located in the channel of an intermittent or perennial stream. As shown on Plate 7-2, roads are located to minimize downstream sedimentation and flooding.

742.420 Primary Roads Primary road design is discussed under 534.

742.421 As described in Section 534, all primary roads are to be located, insofar as practical, on the most stable available surfaces.

742.422 There are no stream fords planned for this operation.

742.423 Drainage Control Road drainage control is discussed in Appendix 7-4.

742.423.1 Primary roads will be equipped with adequate drainage control, including ditches, culverts and relief drains. The drainage control system is designed, and will be constructed and maintained, to pass the peak runoff safely from a 10 year - 6 hour precipitation event, as described in Appendix 7-4.

742.423.2 Culvert design and installation details are described in Appendix 7-4. Inlets and outlets are protected from erosion. Undisturbed culvert inlets are to be equipped with trash racks.

742.423.3 Drainage ditch design details are provided in Appendix 7-4.

742.423.4 There are plans to alter the drainage channel on the south boundary of the disturbed area. This drainage is an ephemeral channel with no riparian habitat. A stream alteration permit will not be required for this channel. A 60 inch culvert and a sedimentation pond will be placed in this channel. Installation of this culvert and sedimentation control plans are described in Appendix 7-4. To ensure that state of the art technology is incorporated, the final reclamation plans for the sedimentation pond area will be submitted prior to commencement of final reclamation of this area.

742.423.5 Stream channel crossings will be provided by culverts designed, constructed and maintained using current, prudent engineering practice, as described in Appendix 7-4.

743. Impoundments

743.100 General Requirements All impoundments associated with this operation are considered temporary.

743.110 Not applicable there are no impoundments planned that meet the criteria of MSHA, 30 CFR 77.216 (a).

743.120 The design of impoundments have been prepared and certified by a qualified, registered professional engineer. As described in Appendix 7-4, the proposed sediment ponds will have at least 2' of freeboard above the highest flow level in the emergency spillway, which is adequate to resist overtopping by waves and by sudden increases in storage volumes.

743.130 As described in Appendix 7-4, the sediment ponds will be equipped with a culvert riser principal spillway and a culvert riser emergency overflow sized to safely pass the runoff from a 25 year - 6 hour precipitation event.

743.131 The principal spillway design is discussed below.

743.131.1 The principle spillway will be constructed of corrugated metal pipe. The emergency spillway will also be constructed of corrugated metal pipe.

744. Discharge Structures

744.100 The sediment pond emergency spillway will be a vertical corrugated metal pipe. It will flow into a 60" diameter C.M.P. beneath the pond and discharge onto an engineered rip-rap apron to prevent scouring or erosion. (See Appendix 7-4).

Diversions and culvert outlets that are expected to have flow velocities in excess of 5 fps will also be equipped with erosion and velocity controls as described in Appendix 7-4.

744.200 Discharge structures have been designed and certified according to standard engineering design procedures. (See Appendix 7-4).

745. Disposal of Excess Spoil Section 745 is not applicable since there are no plans for disposal of excess spoil at the Lila Canyon operation.

746. Coal Mine Waste The area designated for coal mine waste disposal is within an existing depression area which is located beneath and around the proposed coal storage pile area as shown on Plates 5-2, 7-2 and 7-5. This disposal area will be used for disposal of the rock slope material, reject from coal processing, coal contaminated waste from the mine (i.e. roof falls, etc.) and/or sediment pond waste.

The designated waste area will be within the disturbed area and drained to the sediment pond, and will be constructed according to Division and MSHA requirements. Coal mine waste disposal is discussed in detail under Section 536 of this permit.

746.100 General Requirements

746.110 All coal mine waste will be placed in a new disposal area within the permit area as discussed in Section 536 and 746.

746.120 The area selected for coal mine waste disposal will drain to the sediment pond for final treatment to minimize adverse effects on the surface and ground water quality and quantity. (See Plates 7-2 and 7-5).

746.200 Refuse Piles. The refuse area is described under Coal Mine Waste in Section 746 and detailed in Section 536. Rock slope material will be used as fill and is referred to as refuse. No coal refuse pile is anticipated. Other than described in Section 536.

746.210 In the event a refuse pile is needed for future operations the refuse piles would be designed to meet the requirements of the above listed Division regulations as well as applicable MSHA regulations. See Section 536 for details.

746.211 The coal mine waste disposal areas will not be located in an area containing springs, seeps or water courses. As shown on Plates 5-2 and 7-5 and described in Appendix 7-4, runoff from the areas will be drained to the sediment pond.

746.212 As described in Sections 536 and 746, the coal refuse will be placed within the mine workings, rock slope material will be placed in existing depression areas. These areas are below grade and will drain to the sediment pond. Due to the location (below grade) no berms or diversion ditches are planned for the Coal Mine Waste Area. See Appendix 7-4 for hydrologic details.

746.213 Not applicable since there are no underdrains planned for this pile.

746.220 Surface Area Stabilization

746.221 The plan for revegetation of the area is discussed in Section 536.

746.222 There are no plans for any permanent impoundments on the refuse or Coal mine waste area. Small depressions may exist for a short time until regrading is completed. These depressions are normally less than one foot in depth and not left for more than 30 days.

746.300 This section is not applicable since there are no plans to construct any impounding structures of coal mine waste or to impound coal mine waste.

746.400 This section is not applicable since there are no plans to return coal processing waste to abandoned underground workings.

747. Disposal of Noncoal Waste. Disposal of non-coal mine waste is discussed under Section 528.330 of this permit.

747.100 As indicated in Section 528.330, non-coal mine waste will be stored in a controlled manner in a designated area on site. Final disposal of all noncoal mine waste , except concrete during reclamation, will be in a state-approved solid waste disposal area (E.C.D.C.).

747.200 As shown on Plates 5-2B and 7-5, the proposed noncoal mine waste storage area is in a designated site, free of springs or seeps, and drained to the sediment pond.

747.300 There are no plans to dispose of noncoal mine waste within the permit area, except concrete during reclamation. The concrete will be buried beneath a minimum of 2' of non-acid, non-toxic material, and will not degrade surface or ground water.

748. Casing and Sealing of Wells There are only three ground water piezometers on the site IPA-1, IPA-2 and IPA-3. They will be reclaimed according to the requirements of the Division's Performance Standards. If any additional wells are required in the future, requirements of this section will be met.

750. Performance Standards

751. Water Quality Discharges of water from this operation will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U. S. Environmental Protection Agency set forth in 40 CFR Part 434. See Sections 731 and 742.

752. Sediment Control Measures Sediment control measures will be located, maintained, constructed and reclaimed according to plans and designs described under Sections 732, 742, 760 and Appendix 7-4.

752.100 Siltation Structures Siltation structures and diversions will be located, maintained, constructed and reclaimed according to plans and designs described under Sections 732, 742, 763 and Appendix 7-4.

752.200 Road Drainage Roads will be located, designed, constructed, reconstructed, used, maintained and reclaimed as described under Sections 732.400, 742.400 and 762.

752.210 Control or Prevent Erosion See Section 742.400 and Appendix 7-4.

752.220 Control or Prevent Additional Disturbance See Section 742.400 and Appendix 7-4.

752.230 Effluent Standards See Section 742.400 and Appendix 7-4.

752.240 Degradation of Ground Water Systems See Section 742.400 and Appendix 7-4.

752.250 Altering Normal Flow of Water See Section 742.400 and Appendix 7-4.

753. Impoundments and Discharge Structures Impoundments and discharge structures will be located, maintained, constructed and reclaimed as described in Sections 733, 734, 743, 745, 760 and Appendix 7-4.

754. Disposal of Excess Spoil, Coal Mine Waste and Noncoal Mine Waste Disposal areas for excess spoil, coal mine waste and noncoal mine waste will be located, maintained, constructed and reclaimed to comply with Sections 735, 736, 745, 746, 747 and 760.

755. Casing and Sealing of Wells Not applicable since no wells are planned for this site. The three Piezometers will be reclaimed according to the requirements of the Divisions's Performance Standards.

760. Reclamation Reclamation hydrology is detailed in Appendix 7-4.

761. General Requirements Upon completion of operations, the disturbed area will be reclaimed. All drainage and sediment controls are considered temporary and will be removed when no longer required. The sediment pond will remain in place until Phase II Bond Release requirements have been met. At that time, the pond will be removed and the area will be reclaimed in accordance with the approved plan.

762. Roads All roads within the disturbed area are temporary, and will be removed and reclaimed upon completion of operations. An access road will be left in place to reach the sediment pond; however, this road will also be removed and reclaimed when the sediment pond is removed.

762.100 Upon removal of roads, culverts and diversions will also be removed and the natural drainage patterns will be restored.

762.200 Cut and fill slopes will be reshaped according to the approved reclamation plan. This reshaping will be compatible with the postmining land use and will complement the drainage pattern of the surround terrain. Road reclamation is described in Section 550.

763. Siltation Structures. See Appendix 7-4 for details on removal of siltation structures.

763.100 Siltation Structures will be Maintained. As indicated in Section 761, the sediment pond will remain in place until the stability and vegetation requirements for Phase II Bond Release are met. This will be a minimum of 2 years after the last augmented seeding. At this time, the pond will be removed and the area reclaimed.

763.200 Structure is Removed Upon removal of the sediment pond, the area will be regraded and revegetated in accordance with the approved reclamation plan and Sections 358, 356 and 357.

764. Structure Removal A timetable for reclamation activities is provided in Section 542.100.

765. Permanent Casing and Sealing of Wells There are only three ground water piezometers on the site IPA-1, IPA-2 and IPA-3. They will be reclaimed according to the requirements of the Division's Performance Standards. If any additional wells are required in the future, requirements of this section will be met.

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Appendix 7-4
Lila Canyon Mine
Sedimentation and Drainage Control Plan

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SEDIMENTATION AND DRAINAGE CONTROL PLAN

TABLE OF CONTENTS

SEDIMENTATION AND DRAINAGE CONTROL PLAN

1- Introduction

The Sedimentation and Drainage Control Plan for the Lila Canyon Mine has been designed according to the State of Utah R645- Coal Mining Rules, November 1, 1996. All design criteria and construction will be certified by a Utah Registered Professional Engineer.

This plan has been divided into the following three sections:

1) Design of Drainage Control Structures for the Proposed Construction

2) Design of Sediment Control Structures

3) Design of Drainage Control Structures for Reclamation

The general surface water control plan for this project will consist of the following:

(a) This is a new site construction. All areas proposed for disturbance will be sloped to drain to surface ditches and/or culverts where runoff will be carried to two sediment ponds. All minesite drainage controls and watersheds are shown on Plate 7-5 “Proposed Sediment Control Map”.

(b) The majority of undisturbed runoff will be diverted around the minesite and beneath the sediment pond #1 by properly sized culverts. Undisturbed diversion culvert UC-1, is located on the northwest end of the site. This diversion will allow the majority of undisturbed runoff from the Right Fork of Lila Canyon to bypass the mine area beneath sediment pond #1. All undisturbed diversions are designed to carry runoff from a 100 year - 6 hour precipitation event. UC-1 is oversized at 60" diameter.

(c) Two adequately sized sediment ponds will be constructed at the lower end of the site. These ponds are sized to contain and treat the runoff from all of the disturbed area and any contributing undisturbed areas for a 10 year - 24 hour precipitation event. The ponds will be equipped with C.M.P. culvert principle spillway and decant and CMP culvert emergency spillway sized to safely pass runoff from a 25 year - 6 hour precipitation event. The spillways from sediment pond #1 will discharge into the UC-1 CMP culvert running beneath the pond. This culvert will discharge onto an engineered discharge structure and into the Right Fork of Lila Canyon channel below the minesite. The spillways from sediment pond #2 will discharge onto an engineered discharge structure and into the Middle Fork of Lila Canyon channel below the minesite.

DESIGN OF DRAINAGE CONTROL STRUCTURES

Design Parameters:

Tables:

Figures:

Design Parameters

2.1 Precipitation

The precipitation-frequency values for the area were taken from the approved Mining and Reclamation Plan, Horse Canyon Mine, Emery County, Utah, Volume III, submitted by I.P.A.

Frequency - Duration	Precipitation
10 year - 6 hour	1.30"
10 year - 24 hour	1.90"
25 year - 6 hour	1.50"
100 year - 6 hour	1.90"

2.2 Flow

Peak flows, flow depths, areas and velocities were calculated using the computer program "Office of Surface Mining Watershed Model", Storm Version 6.21 by Gary E. McIntosh. All flows are based on the SCS - TR55 Method for both SCS 6-hour and NOAA Type II, 24-hour storms.

Time of concentration of storm events was calculated for each drainage area using the SCS upland curve method included as part of the Storm software. For the undisturbed areas UA-1 and UA-4 the watershed type was set at forested and the curve condition was set at bare ground. For UA-6a and UA-6b and all DA watersheds, the watershed type was set as disturbed and the curve condition was set at bare ground.

2.3 Velocity

Flow velocities for each ditch structure were calculated using the Storm computer program with Manning's Formula:

$$V = \frac{1.49}{n} R^{2/3} S^{1/3}$$

where:

	V	=	Velocity (fps)
	R	=	Hydraulic Radius (ft.)
	S	=	Slope (ft. per ft.)
	n	=	Manning's n; Table 3.1, p. 159,

"Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner & Haan, 1983.

Note: The following Manning's n were used in the calculations:

Structure	Manning's n
Culverts (cmp)	0.025
Unlined Disturbed Area Ditches	0.035

2.4 Drainage Areas

All drainage areas were planimetered directly from either Plate 7-1, "Permit Area Hydrology Map", and Plate 7-2, "Disturbed Area Hydrology/Watershed".

2.5 Slopes, Lengths

All slopes and lengths were measured directly from the topography on Plates 7-1 and 7-2.

2.6 Runoff Volume

Runoff was calculated using the SCS Formula for NOAA Type II, 24-hour storms; using the Storm Version 6.21 computer program:

$$Q = \frac{(P - 0.2\,S)^2}{P + 0.8\,S}$$

where:

CN	=	Runoff Curve Number
Q	=	Runoff in inches
P	=	Precipitation in inches
S	=	$\frac{1000}{CN} - 10$

2.7 Runoff Curve Numbers

Two curve numbers were utilized for the undisturbed areas. Areas with milder slopes (less than 30%) were given a runoff curve number of 75. All other undisturbed areas (30% slope or greater) were given a runoff curve number of 83. These numbers were taken directly from the approved "Mining and Reclamation Plan, Horse Canyon Mine, Emery County, Utah, Volume III", submitted by I.P.A. The numbers in that plan were based on vegetation and soils data from on-site.

Two other runoff curve numbers have been used in the calculations. A runoff CN of 90 is used for all disturbed areas (including the areas designated as undisturbed which lie within the disturbed area boundary (See Plate 7-2), and a runoff CN of 95 is used for paved areas. These numbers are based on commonly used and approved values and from Table 2.20, (p. 82, Barfield, et al, 1983).

The following is a summary of runoff curve numbers used in these calculations:

Watershed	Runoff CN
Undisturbed (<30% slopes):	75
Undisturbed (>30% slopes):	83
Disturbed:	90
Paved:	95

2.8 Culvert Sizing

Minimum culvert sizing is based on the either the inlet control nomograph or Manning's Equation. Culverts were evaluated for inlet control conditions to determine the minimum pipe size using the Culvert Nomograph included as Figure 1 of this Appendix. If the pipe had a HW/D ratio equal to or greater than 1.0 or the slope were less than 2% the Haestad Methods, Flowmaster, Version 6.0 computer program was used to determine the pipe flow diameter using:

$$D = \left(\frac{2.16\ Q\ n}{\sqrt{s}}\right)^{0.35}$$

where:	D	=	Required Diameter (feet)
	Q	=	QP = Peak Discharge (cfs)
	n	=	Roughness Factor (0.025 for CMP)
	S	=	Slope (ft. per ft.)

2.9 Culverts

Culverts have been sized according to the calculations previously described, and are shown on Plate 7-5, "Proposed Sediment Control Map". Culverts carrying undisturbed drainages are designated with UC- Letters (i.e. UC-1). All undisturbed area drainage culverts will be fitted with trash racks to minimize plugging by rocks or other debris.

Trash racks will be provided at the inlet for all undisturbed drainage culverts. These will consist of 3/4" steel bars welded on 6" centers across the flared inlet structures of each culvert. Bars will be sloped from the front of the inlet structure up to the top of the culvert. This ramp configuration will allow trash, branches and other potential obstructions to be swept up and away from the inlet rather than being impinged against the grates during a flow event. Rip rap will be placed around the flared inlet structure and above it to a height of at least 6" above the required headwall for each culvert. (See Figure 4 for details). Trash racks will be checked on a routine schedule and following precipitation events and all trash, branches and other obstructions will be removed.

It should be noted that all undisturbed area culverts are adequately sized to handle the expected runoff from a <u>100 year - 6 hour event</u> for maximum protection of the mine area, sediment pond and undisturbed drainage. This is well in excess of the 10 year - 6 hour event required by the regulations and is proposed as an extra measure of safety.

Disturbed area culverts and ditches are shown on the "Sediment Control Map", Plate 7-5. Culverts carrying disturbed drainage are designated with a DC-number (i.e. DC-1). Calculations for all disturbed area culverts and ditches are also included with this report, along with design criteria. Disturbed drainage areas draining to culverts and ditches are marked with a DA-number (i.e. DA-1). Undisturbed drainage areas are marked with a UA-number (i.e. UA-1).

Culverts will be inspected regularly, and cleaned as necessary to provide for passage of drainage flows. Inlets and outlets shall also be maintained so as to prevent plugging or undue restriction of water flow.

All disturbed area culverts are temporary, and will be removed upon final reclamation.

2.10 Main Canyon Culvert - Outlet Structure

The outlet of culvert UC-1 has been designed to flow onto a rip-rap apron to protect against souring and to allow for energy dissipation. The rip-rap apron is designed to fit the natural channel configuration as closely as possible, and will allow runoff to re-enter the natural channel at a reduced velocity which is no greater than natural flow conditions. Runoff from the 100 year - 6 hour precipitation event in the canyon below the minesite has been calculated at 52.32 cfs, including sediment pond overflow.

The rip-rap apron design is based on Figure 7-26, Design of Outlet Protection - Maximum Tailwater Condition, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983. Based on the figure, the apron should be a minimum of 15' in length, widening from 5' to 9', with a 0.1% slope. The proposed length has been increased to 20', to ensure adequate time for velocity reduction. The apron slope is kept at 0.1%. Rip-rap size is conservatively placed at 12" D_{50}. Rip-rap will be placed to a depth of 1.5 D_{50} and will be placed on a 6" layer of 2" drain rock filter. Rip-rap will also be placed on the 2H:1V side slopes to the height of the culvert (4') at the culvert outlet tapering to 3' at the outlet of the apron. This rip-rap apron has been sized and designed to adequately dissipate energy from flow velocities of a 100 year - 6 hour precipitation event and resist dislodgement. The drain rock filter bed will also serve to secure the rip-rap boulders firmly in place, to add an additional element of stability, and prevent scouring underneath the armored apron. (See Figure 4A for construction details). The natural channel below the culvert has a gradient of approximately 7.76%. When the flow is routed from the culvert across the apron to the natural channel, the velocity is reduced from 4.79 fps at the culvert outlet to 1.50 fps at the outlet of the apron. (See Culvert Outlet Rip-Rap Apron Flow Velocity Calculations in Appendix 1.)

It should be noted that these calculations are based on a <u>100 year - 6 hour event</u>.

2.11 Ditches

All ditches will carry disturbed area drainage to the pond. Ditches are shown on the Proposed Sediment Control Map, Plate 7-5, and are designated with a DD-number (i.e. DD-1 for Disturbed Area Ditches) or UD-number (i.e. UD-1 for Undisturbed Area Ditches).

All ditches are designed to carry the expected runoff from a 10 year - 6 hour event with a minimum freeboard of 0.5' (See Table 8 and Figure 3).

Ditches which exhibit expected flow velocities of 5 fps or greater will be lined with rip-rap. A typical cross-section is shown on Figure 3 and flow depths and areas for all lined and unlined ditches are presented in Table 8 of this report.

Ditch slopes have been determined from Plates 7-2 and 7-5.

All ditches will be inspected regularly, and maintained to the minimum dimensions to provide adequate capacity for the design flow. All ditches are temporary and will be removed as described under the reclamation hydrology section. (Section 4)

TABLE 1

Table 1 Undisturbed Watershed Summary		
Watershed	Drains To	Final
UA-1	UC-1	Lila Canyon
UA-2	DD-2	Sediment Pond
UA-4	Sediment Pond	Sediment Pond
UA-6a	DD-12	Sediment Pond
UA-6b	DD-11	Sediment Pond
UA-7	ASCA Area	Lila Canyon
UA-8	ASCA Area	Lila Canyon

TABLE 2

Table 2
Disturbed Watershed Summary

Watershed	Drains To	Final
DA-1a	DD-1a	Sediment Pond
DA-1b	DD-1b	Sediment Pond
DA-1c	DD-1c	Sediment Pond
DA-2a	DD-2a	Sediment Pond
DA-2b	DD-2b	Sediment Pond
DA-2c	DD-2c	Sediment Pond
DA-3	DD-3	Sediment Pond
DA-4a	DD-4a	Sediment Pond
DA-4b	DD-4b	Sediment Pond
DA-4c	DD-4c	Sediment Pond
DA-5a	DD-5a	Sediment Pond
DA-5b	DD-5b	Sediment Pond
DA-5c	DD-5c	Sediment Pond
DA-6a	DD-6a	Sediment Pond
DA-6b	DD-6b	Sediment Pond
DA-6c	DD-6c	Sediment Pond
DA-7	DD-7	Sediment Pond
DA-8a	DD-8a	Sediment Pond
DA-8b	DD-8b	Sediment Pond
DA-8c	DD-8c	Sediment Pond
DA-9	DD-9	Sediment Pond
DA-10	DD-10	Sediment Pond
DA-11	DD-11	Sediment Pond
DA-13a	DD-13a	Sediment Pond
DA-13b	DD-13d	Sediment Pond
DA-13c	DD-13e	Sediment Pond
DA-14a	DD-14a	Sediment Pond 2
DA-14b	DD-14b	Sediment Pond 2
DA-15a	DD-15a	Sediment Pond 2
DA-15b	DD-15b	Sediment Pond 2
DA-16a	DD-16a	Sediment Pond 2
DA-16b	DD-16b	Sediment Pond 2
DA-17a	DD-17a	Sediment Pond 2
DA-17b	DD-17b	Sediment Pond 2
DA-18a	DD-18a	Sediment Pond 2
DA-18b	DD-18b	Sediment Pond 2
TS-1	Topsoil Berm	Sediment Pond
POND	Sediment Pond	Sediment Pond

TABLE 3

Table 3
Watershed Parameters

Watershed	Area (Acre)	Hydraulic Length (ft.)	Elevation Change (ft.)	% Slope	CN
Undisturbed Watersheds					
UA-1	248.41	5200	1480	28.46	75
UA-2	10.01	1500	1000	66.67	83
UA-4	14.08		595	47.76	83
	1.45	230	80	34.70	90
UA-6b	0.40	90	30	33.33	90
UA-7	0.60	195	25	12.80	90
UA-8	0.37	100	30	30.00	90
Disturbed Watersheds					
DA-1a	0.33	680	152	22.35	95
DA-1b	0.31	420	48	11.43	95
DA-1c	0.20	225	20	8.89	95
DA-2a	0.93	680	162	23.82	95
DA-2b	0.14	350	36	10.29	95
DA-2c	0.10	106	16	15.10	95
DA-3	0.30	170	16	9.41	90
DA-4a	0.14	100	12	12.00	95
DA-4b	0.12	270	28	10.37	95
DA-4c	0.60	580	54	9.31	95
DA-5a	0.07	180	24	13.33	95
DA-5b	0.33	125	14	11.20	90
DA-5c	0.42	570	54	9.47	95
DA-6a	0.28		54	27.	90
DA-6b	3.35	760	70	9.21	90
DA-6c	2.51	690	70	10.14	90
DA-7	2.68	630	30	4.76	95
DA-8a	0.26	284	54	19.01	90
DA-8b	0.76	670	52	7.80	90
DA-8c	0.95	410	42	10.24	90
DA-9	0.05	50	6	12.00	95
DA-10	2.89	700	20	2.86	95
DA-11	0.78	340	16	4.70	95
DA-13a	1.97	470	12	2.55	95
DA-13b	0.49	280	4	1.43	90
DA-13c	0.40	460	22	4.78	90
DA-14a	0.36	390	34	8.71	95

TABLE 3 (Continued)

Table 3 Watershed Parameters					
Watershed	Area (Acre)	Hydraulic Length (ft.)	Elevation Change (ft.)	% Slope	CN
Disturbed Watersheds					
DA-14b	0.75	540	16	2.96	95
DA-15a	0.38	525	50	9.52	95
DA-15b	0.62	270	12	4.44	95
DA-16a	0.16	370	10	2.70	95
DA-16b	0.09	210	13	6.19	95
DA-17a	0.42	610	19	3.11	95
DA-17b	0.07	100	5	5.00	95
DA-18a	0.07	175	6	3.43	95
DA-18b	0.44	650	24	3.69	95
TS-1	2.95	660	38	5.75	83
POND	1.92	380	50	13.16	95

TABLE 4

Table 4
Runoff Summary
Undisturbed Watersheds (Not Draining to Ponds)

Watershed	10 yr. / 6 hr. Peak Flow - cfs	25 yr. / 6 hr. Peak Flow - cfs	100 yr. / 6 hr. Peak Flow - cfs	10 yr. / 24 hr. Peak Flow - cfs	10 yr. / 24 hr. Volume - ac.ft.
UA-1	7.02	10.31	20.48	25.53	6.90
UA-7	0.21	0.27	0.40	0.43	0.03
UA-8	0.14	0.18	0.26	0.14	0.03

TABLE 5

Table 5 Runoff Summary Watershed Drainage to Sediment Pond				
Watershed	10 yr. / 6 hr. Peak Flow-cfs	25 yr. / 6 hr. Peak Flow-cfs	10 yr. / 24 hr. Peak Flow-cfs	10 yr. / 24 hr. Volume-ac-ft
Undisturbed Watersheds draining to Pond #1				
UA-2	2.11	3.11	6.11	0.52
UA-4	3.14	4.65	9.20	0.74
UA-6a	0.47	0.60	0.95	0.12
UA-6b	0.10	0.13	0.21	0.03
Disturbed Watersheds draining to Pond #1				
DA-1a	0.22	0.26	0.37	0.04
DA-1b	0.20	0.24	0.33	0.04
DA-1c	0.11	0.14	0.19	0.02
DA-2a	0.61	0.73	1.03	0.11
DA-2b	0.09	0.10	0.15	0.02
DA-2c	0.04	0.05	0.08	0.01
DA-3	0.11	0.14	0.21	0.03
DA-4a	0.06	0.08	0.11	0.02
DA-4b	0.07	0.08	0.12	0.01
DA-4c	0.42	0.51	0.71	0.07
DA-5a	0.05	0.06	0.09	0.01
DA-5b	0.11	0.14	0.21	0.03
DA-5c	0.29	0.35	0.49	0.05
DA-6a	0.09	0.12	0.18	0.02
DA-6b	1.60	2.06	3.27	0.28
DA-6c	1.18	1.52	2.40	0.21
DA-7	1.98	2.39	3.36	0.31
DA-8a	0.10	0.12	0.19	0.02
DA-8b	0.36	0.47	0.74	0.06
DA-8c	0.40	0.52	0.81	0.08
DA-9	0.04	0.05	0.07	0.01
DA-10	2.19	2.65	3.73	0.33
DA-11	0.52	0.63	0.89	0.09
DA-13a	1.46	1.76	2.47	0.23
DA-13b	0.23	0.30	0.47	0.04
DA-13c	0.19	0.24	0.38	0.03
TS-1	0.65	0.96	1.90	0.15
POND	1.18	1.42	1.99	0.22
TOTAL		26.58		3.95

TABLE 5 (Continued)

Table 5 Runoff Summary Watershed Drainage to Sediment Pond				
Watershed	10 yr. / 6 hr. Peak Flow-cfs	25 yr. / 6 hr. Peak Flow-cfs	10 yr. / 24 hr. Peak Flow-cfs	10 yr. / 24 hr. Volume-ac-ft
Disturbed Watersheds draining to Pond #2				
DA-14a	0.23	0.28	0.39	0.04
DA-14b	0.56	0.67	0.95	0.09
DA-15a	0.26	0.31	0.44	0.04
DA-15b	0.40	0.48	0.67	0.07
DA-16a	0.11	0.14	0.19	0.02
DA-16b	0.06	0.07	0.10	0.01
DA-17a	0.31	0.38	0.53	0.05
DA-17b	0.05	0.06	0.09	0.01
DA-18a	0.06	0.07	0.10	0.01
DA-18b	0.33	0.40	0.56	0.05
TOTAL		2.86		0.

TABLE 6

Table 6
Runoff Control Structure
Watershed Summary

Structure	Type	Contributing Watersheds/Structures
UC-1	Culvert	UA-1, UA-7, Sediment Pond Overflow
DD-1a	Ditch	DA-1a
DD-1b	Ditch	DD-1a, DA-1b, UA-6b
DC-2	Culvert	DD-1b
DD-1c	Ditch	DC-2, DA-1c
DD-2a	Ditch	DA-2a, UA-2
DD-2b	Ditch	DD-2a, DA-2b
DC-1	Culvert	DD-2b, UA-2
DD-2c	Ditch	DC-1, DA-2c
DC-3	Culvert	DD-2c
DD-3	Ditch	DA-3
DC-4	Culvert	DD-3
DD-4a	Ditch	DA-4a
DD-4b	Ditch	DD-4a, DC-4, DA-4b
DC-20	Culvert	DD-4b
DD-4c	Ditch	Dc-20, DA-4c
DC-9	Culvert	DD-4c
DD-5a	Ditch	DA-5a
DD-5b	Ditch	DD-5a, DA-5b
DC-5	Culvert	DD-5b
DD-5c	Ditch	DC-5, DA-5c
DC-10	Culvert	DD-5c, DC-9
DD-6a	Ditch	DC-3, DD-1c, DA-6a

Table 6
Runoff Control Structure
Watershed Summary

Structure	Type	Contributing Watersheds/Structures
DC-6	Culvert	DD-6a
DD-6b	Ditch	DC-6, DA-6b
DD-6c	Ditch	DA-6c
DC-8	Culvert	DD-6b, DD-6c
DD-7	Ditch	DA-7
DC-7	Culvert	DD-7
DD-8a	Ditch	DA-8a
DD-8b	Ditch	DD-8a, DC-7, DA-8b
DD-8c	Ditch	DD-8b, DC-8, DA-8c
DD-9	Ditch	DC-10, DD-5c, DA-9
DC-11	Culvert	DD-9
DD-10	Ditch	DA-10
DC-12	Culvert	DD-10
DD-11	Ditch	DA-11
DD-12	Ditch	DD-7, UA-6a
DD-13a	Ditch	DC-11, DA-13a
DD-13b	Ditch	DD-13a, DD-11
DD-13c	Ditch	DD-13b, DC-12
DD-13d	Ditch	DD-13c, DD-8c, DD-13b
DC-13	Culvert	DD-13d
DD-13e	Ditch	DC-13, DA-13c
DD-14a	Ditch	DA-14a
DD-14b	Ditch	DA-14b
DC-14	Culvert	DD-14a, DD-14b
DD-15a	Ditch	DA-15a

Table 6
Runoff Control Structure
Watershed Summary

Structure	Type	Contributing Watersheds/Structures
DD-15b	Ditch	DD-15a, DA-15b
DC-19	Culvert	DD-15b
DD-16a	Ditch	DA-16a
DC-15	Culvert	DD-16a
DD-16b	Ditch	DC-15, DA-16b
DD-17a	Ditch	DA-17a
DC-16	Culvert	DD-17a
DD-17b	Ditch	DC-16, DC-14, DA-17b
DC-17	Culvert	DD-17b, DD-16b
DD-18a	Ditch	DA-18a
DC-18	Culvert	DD-18a
DD-18b	Ditch	DC-18, DA-18b

DD-12 does not exist.

TABLE 7

Table 7
Runoff Control Structure
Flow Summary

Structure	Type	10yr. / 6hr. Peak Flow-cfs	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs
UC-1	Culvert	38.67	57.40	42.02	52.32
DD-1a	Ditch	0.22	0.37	0.26	- -
DD-1b	Ditch	0.52	0.91	0.63	- -
DC-2	Culvert	0.52	0.91	0.63	- -
DD-1c	Ditch	0.63	1.10	0.77	- -
DD-2a	Ditch	2.72	7.14	3.84	- -
DD-2b	Ditch	2.81	7.29	3.94	- -
DC-1	Culvert	2.81	7.29	3.94	- -
DD-2c	Ditch	2.85	7.37	3.99	- -
DC-3	Culvert	2.85	7.37	3.99	- -
DD-3	Ditch	0.11	0.21	0.14	- -
DC-4	Culvert	0.11	0.21	0.14	- -
DD-4a	Ditch	0.06	0.11	0.08	- -
DD-4b	Ditch	0.24	0.44	0.30	- -
DC-20	Culvert	0.24	0.44	0.30	- -
DD-4c	Ditch	0.66	1.15	0.81	- -
DC-9	Culvert	0.66	1.15	0.81	- -
DD-5a	Ditch	0.05	0.09	0.06	- -
DD-5b	Ditch	0.16	0.30	0.20	- -
DC-5	Culvert	0.16	0.30	0.20	- -
DD-5c	Ditch	0.45	0.79	0.55	- -
DC-10	Culvert	1.11	1.94	1.36	- -
DD-6a	Ditch	2.94	7.55	4.11	- -

Table 7 Runoff Control Structure Flow Summary					
Structure	Type	10yr. / 6hr. Peak Flow-cfs	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs
DC-6	Culvert	2.94	7.55	4.11	- -
DD-6b	Ditch	4.54	10.82	6.17	- -
DD-6c	Ditch	1.18	2.40	1.52	- -
DC-8	Culvert	5.72	13.22	7.69	- -
DD-7	Ditch	2.45	4.31	2.99	- -
DC-7	Culvert	2.45	4.31	2.99	- -
DD-8a	Ditch	0.10	0.19	0.12	- -
DD-8b	Ditch	2.91	5.24	3.58	- -
DD-8c	Ditch	6.12	14.03	8.21	- -
DD-9	Ditch	0.04	2.80	1.96	- -
DC-11	Culvert	1.60	2.80	1.96	- -
DD-10	Ditch	2.19	3.73	2.65	- -
DC-12	Culvert	2.19	3.73	2.65	- -
DD-11	Ditch	0.52	0.89	0.63	- -
DD-13a	Ditch	3.06	5.27	3.72	- -
DD-13b	Ditch	3.58	6.16	4.35	- -
DD-13c	Ditch	5.77	9.89	7.00	- -
DD-13d	Ditch	6.35	14.50	8.51	- -
DC-13	Culvert	6.35	14.50	8.51	- -
DD-13e	Ditch	6.54	14.88	8.75	- -
DD-14a	Ditch	0.23	0.39	0.28	- -
DD-14b	Ditch	0.56	0.95	0.67	- -
DC-14	Culvert	0.79	1.34	0.95	- -
DD-15a	Ditch	0.26	0.44	0.31	- -

Table 7
Runoff Control Structure
Flow Summary

Structure	Type	10yr. / 6hr. Peak Flow-cfs	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs
DD-15b	Ditch	0.66	1.11	0.79	- -
DC-19	Culvert	0.66	1.11	0.79	- -
DD-16a	Ditch	0.11	0.19	0.14	- -
DC-15	Culvert	0.11	0.19	0.14	- -
DD-16b	Ditch	0.17	0.29	0.21	- -
DD-17a	Ditch	0.31	0.53	0.38	- -
DC-16	Culvert	0.31	0.53	0.38	- -
DD-17b	Ditch	1.15	1.96	1.39	- -
DC-17	Culvert	1.32	2.25	1.60	- -
DD-18a	Ditch	0.06	0.10	0.07	- -
DC-18	Culvert	0.06	0.10	0.07	- -
DD-18b	Ditch	0.39	0.66	0.47	- -

DD-12 does not exist.
UC-1flow values include 25yr-6hr sediment pond peak flow 31.44 cfs.

TABLE 8

Table 8 Disturbed Ditch Design Summary						
Ditch	DD-1a	DD-1b	DD-1c	DD-2a	DD-2b	DD-2c
Slope (%)	11.42	11.20	10.00	12.06	10.29	14.29
Length (ft.)	683	420	20	680	350	105
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	0.00	0.00	0.00	2.00	2.00	2.00
Peak Flow 10/6 (cfs)	0.22	0.52	0.63	2.72	2.81	2.85
Peak Flow 10/24 (cfs)	0.37	0.91	1.10	7.14	7.29	7.37
Flow Depth (ft.) 10/6	0.20	0.27	0.30	0.23	0.24	0.22
Flow Depth (ft.) 10/24	0.24	0.34	0.37	0.39	0.42	0.38
Flow Area (ft.^{2}) 10/6	0.08	0.15	0.18	0.56	0.61	0.55
Flow Area (ft.^{2}) 10/24	0.11	0.23	0.27	1.10	1.18	1.06
Velocity (fps) 10/6	2.84	3.49	3.51	4.81	4.61	5.18
Velocity (fps) 10/24	3.23	4.02	4.04	6.49	6.18	6.96
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N
Rip-Rap D_{50}	-	-	-	-	-	-
Note: Slope/Lengths from Plate 7-2.						

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-3	DD-4a	DD-4b	DD-4c	DD-5a	DD-5b	DD-5c
Slope (%)	0.60	11.00	10.26	10.00	13.11	11.11	9.52
Length (ft.)	171	100	273	580	183	126	567
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peak Flow 10/6 (cfs)	0.11	0.06	0.24	0.66	0.05	0.16	0.45
Peak Flow 10/24 (cfs)	0.21	0.11	0.44	1.15	0.09	0.30	0.79
Flow Depth (ft.) 10/6	0.26	0.12	0.21	0.30	0.11	0.18	0.27
Flow Depth (ft.) 10/24	0.34	0.15	0.26	0.38	0.14	0.22	0.33
Flow Area (ft.^{2}) 10/6	0.14	0.03	0.09	0.19	0.02	0.06	0.14
Flow Area (ft.^{2}) 10/24	0.23	0.05	0.14	0.28	0.04	0.10	0.22
Velocity (fps) 10/6	0.79	2.02	2.79	3.55	2.06	2.59	3.17
Velocity (fps) 10/24	0.93	2.35	3.24	4.08	2.39	3.04	3.65
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N
Rip-Rap D_{50}	-	-	-	-	-	-	-
Note: Slope/Lengths from Plate 7-2.							

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-6a	DD-6b	DD-6c	DD-7	DD-8a	DD-8b	DD-8c
Slope (%)	18.00	2.56	3.38	1.08	20.42	7.81	10.34
Length (ft.)	200	507	532	370	284	666	406
Manning's No.	0.040	0.035	0.035	0.035	0.035	0.035	0.040
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	3.00	1.00	1.00	1.00	0.00	1.00	2.00
Peak Flow 10/6 (cfs)	2.94	4.54	1.18	2.45	0.10	2.91	6.12
Peak Flow 10/24 (cfs)	7.55	10.82	2.40	4.31	0.19	5.24	14.03
Flow Depth (ft.) 10/6	0.19	0.60	0.28	0.55	0.13	0.37	0.41
Flow Depth (ft.) 10/24	0.32	0.90	0.41	0.72	0.17	0.49	0.63
Flow Area (ft.^{2}) 10/6	0.62	1.32	0.45	1.15	0.03	0.63	1.14
Flow Area (ft.^{2}) 10/24	1.17	2.52	0.75	1.75	0.06	0.98	2.07
Velocity (fps) 10/6	4.71	3.43	2.64	2.12	2.90	4.59	5.35
Velocity (fps) 10/24	6.47	4.29	3.21	2.46	3.40	5.37	6.78
Rip-Rap Req'd (Y/N)	Y	N	N	N	N	N	Y
Rip-Rap D_{50}	6"	-	-	-	-	-	6"
Note: Slope/Lengths from Plate 7-2.							

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-9	DD-10	DD-11	DD-13a	DD-13b	DD-13c	DD-13d
Slope (%)	10.00	3.02	5.06	2.53	3.23	3.30	1.25
Length (ft.)	50	696	336	474	62	38	278
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	0.00	1.00	0.00	1.00	1.00	1.00	3.00
Peak Flow 10/6 (cfs)	0.04	2.19	0.52	3.06	3.58	5.77	6.35
Peak Flow 10/24 (cfs)	0.07	3.73	0.89	5.27	6.16	9.89	14.50
Flow Depth (ft.) 10/6	0.11	0.40	0.32	0.50	0.51	0.63	0.57
Flow Depth (ft.) 10/24	0.13	0.53	0.39	0.65	0.66	0.82	0.89
Flow Area ($ft.^2$) 10/6	0.02	0.73	0.20	0.99	1.02	1.44	2.36
Flow Area ($ft.^2$) 10/24	0.03	1.08	0.30	1.48	1.52	2.15	4.25
Velocity (fps) 10/6	1.76	3.00	2.59	3.08	3.51	4.01	2.69
Velocity (fps) 10/24	2.03	3.46	2.97	3.55	4.05	4.61	3.41
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N
Rip-Rap D_{50}	-	-	-	-	-	-	-
Note: Slope/Lengths from Plate 7-2.							

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-13e	DD-14a	DD-14b	DD-15a	DD-15b	DD-16a	DD-16b
Slope (%)	4.78	8.72	3.15	9.70	4.07	2.97	6.06
Length (ft.)	460	390	540	525	270	370	165
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	3.00	0.00	0.00	0.00	0.00	0.00	0.00
Peak Flow 10/6 (cfs)	6.54	0.23	0.56	0.26	0.66	0.11	0.17
Peak Flow 10/24 (cfs)	14.88	0.39	0.95	0.44	1.11	0.19	0.29
Flow Depth (ft.) 10/6	0.40	0.21	0.36	0.22	0.36	0.20	0.20
Flow Depth (ft.) 10/24	0.63	0.26	0.43	0.26	0.44	0.24	0.25
Flow Area (ft.^{2}) 10/6	1.52	0.09	0.25	0.09	0.26	0.08	0.08
Flow Area (ft.^{2}) 10/24	2.68	0.13	0.38	0.14	0.38	0.12	0.12
Velocity (fps) 10/6	4.31	2.59	2.21	2.78	2.54	1.44	2.10
Velocity (fps) 10/24	5.54	2.96	2.52	3.18	2.89	1.65	2.40
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N
Rip-Rap D_{50}	-	-	-	-	-	-	-
Note: Slope/Lengths from Plate 7-2.							

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-17a	DD-17b	DD-18a	DD-18b			
Slope (%)	2.68	4.12	2.86	3.54			
Length (ft.)	485	97	175	650			
Manning's No.	0.035	0.035	0.035	0.035			
Side Slope (H:V)	2:1	2:1	2:1	2:1			
*Bottom Width (ft.)	0.00	0.00	0.00	0.00			
Peak Flow 10/6 (cfs)	0.31	1.15	0.06	0.39			
Peak Flow 10/24 (cfs)	0.53	1.96	0.10	0.66			
Flow Depth (ft.) 10/6	0.29	0.44	0.16	0.30			
Flow Depth (ft.) 10/24	0.36	0.54	0.19	0.37			
Flow Area (ft.^{2}) 10/6	0.17	0.39	0.05	0.18			
Flow Area (ft.^{2}) 10/24	0.26	0.59	0.07	0.27			
Velocity (fps) 10/6	1.80	2.93	1.22	2.11			
Velocity (fps) 10/24	2.05	3.35	1.39	2.41			
Rip-Rap Req'd (Y/N)	N	N	N	N			
Rip-Rap D_{50}	-	-	-	-			
Note: Slope/Lengths from Plate 7-2.							

TABLE 9

Table 9
Disturbed Culvert Design Summary

Culvert	DC-1	DC-2	DC-3	DC-4	DC-5	DC-6
Slope (%)	13.33	10.77	3.03	21.50	12.00	5.00
Length (ft.)	30	65	33	135	50	80
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	2.81	0.52	2.85	0.11	0.16	2.94
Peak Flow 10/24 (cfs)	7.29	0.91	7.37	0.21	0.30	7.55
Diam. Proposed (ft.)	1.50	1.50	1.50	1.50	1.50	2.00
Velocity (fps) 10/24	10.72	5.31	5.94	4.35	3.95	7.27
Rip-Rap D_{50}	6"	6"	6"	N/A	N/A	6"

Note: Slope/Lengths from Plate 7-5.
Velocity: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 9 (Continued)

Table 9
Disturbed Culvert Design Summary

Culvert	DC-7	DC-8	DC-9	DC-10	DC-11	DC-12
Slope (%)	46.40	38.80	5.70	14.25	4.60	4.00
Length (ft.)	110	85	35	55	65	50
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	2.45	5.72	0.66	1.11	1.60	2.19
Peak Flow 10/24 (cfs)	4.31	13.22	1.15	1.94	2.80	3.73
Diam. Proposed (ft.)	1.50	2.00	1.50	1.50	1.50	1.50
Velocity (fps) 10/24	14.05	17.69	4.55	7.33	5.44	5.60
Rip-Rap D_{50}	12"	12"	N/A	6"	6"	6"

Note: Slope/Lengths from Plate 7-5.
Velocity: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 9 (Continued)

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18
Slope (%)	3.33	3.33	3.33	3.33	4.00	5.70
Length (ft.)	30	60	60	60	75	35
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	6.35	0.79	0.11	0.31	1.32	0.06
Peak Flow 10/24 (cfs)	14.50	1.34	0.19	0.53	2.25	0.10
Diam. Proposed (ft.)	2.00	1.50	1.50	1.50	1.50	1.50
Velocity (fps) 10/24	7.34	3.93	2.20	2.99	4.87	2.19
Rip-Rap D_{50}	6"	N/A	N/A	N/A	N/A	N/A
Note: Slope/Lengths from Plate 7-5. Velocity: (Haestad Methods, Flowmaster, Version 6.0)						

TABLE 9 (Continued)

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-19					
Slope (%)	2.50					
Length (ft.)	40					
Manning's No.	0.025					
Peak Flow 10/6 (cfs)	0.66					
Peak Flow 10/24 (cfs)	1.11					
Diam. Proposed (ft.)	1.50					
Velocity (fps) 10/24	3.36					
Rip-Rap D_{50}	N/A					

Note: Slope/Lengths from Plate 7-5.
Source: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 10

Table 10 Undisturbed Culvert Design Summary		
Culvert	UC-1	
Slope (%)	0.50	
Length (ft.)	480	
Manning's No.	0.025	
Peak Flow 10/6 (cfs)	38.67	
Peak Flow 100/6 (cfs)	52.32	
Diam. Proposed (ft.)	4.00	
Velocity (fps) 100/6	4.79	
* Note: Peak Flows include 25 year - 6 hour design overflow 31.44 cfs from sediment pond.		

DESIGN OF SEDIMENT CONTROL STRUCTURES

Design Specifications:

Tables:

Figures:

3.1 Design and Construction Specifications for Sedimentation Pond

a) All construction of sedimentation ponds will be performed under the direction of a qualified, registered professional engineer.

b) The sediment pond #1 will be located in an existing low area where the Right Fork of Lila Canyon passes beneath the existing road. The existing road fill and culvert will be removed, and the pond embankment (road fill) will be reconstructed and compacted. The existing culvert will be replaced with UC-1 which will extend approximately 300' up the Right Fork of Lila Canyon. This culvert will be equipped with an inlet section and trash rack, and will allow undisturbed runoff and treated access road drainage to pass beneath the sediment pond. The majority of the pond will be in an existing channel area, and is therefore considered incised. The embankment will be reconstructed to a maximum of 2h:1v slopes, with the total of inside and outside slopes not less than 5h:1v. The pond will be equipped with a culvert riser principal spillway with an oil skimmer, a decant, and a second culvert riser emergency spillway with an oil skimmer. Both spillways will discharge to the oversized (60") CMP culvert running beneath the pond.

c) The area of pond constructed shall be examined for topsoil, and where present in removable quantities, such soil shall be removed separately and stored in an approved topsoil storage location.

d) In areas where fill is to be placed for the pond impoundment structures, natural ground shall be removed to at least 12" below the base of the structure.

e) Native materials shall be used where practical. Fill will be placed in lifts not to exceed 6" and compacted prior to placement of next lift. Compaction of all fill materials shall be at least 95%.

f) Rip-rap or other protection (culverts, concrete, etc.) will be placed at all pond inlets to prevent scouring. Rip-rap will consist of substantial, angular (non-slaking) rock material of adequate size.

g) Decanting of the pond, as required, will be accomplished by use of a decant pipe with an inverted inlet as shown on Plate 7-6. Samples will be collected prior to decanting of the pond. If the quality of the water meets the requirements of the U.P.D.E.S. Permit, decanting will proceed. Discharge samples will be collected as per the approved U.P.D.E.S. Discharge Permit.

h) Slopes of the embankments shall not be steeper than 2h:1v, inside or outside, with a total of the inslope and outslope not less than 5h:1v, except where areas of the pond are incised.

i) External slopes of the impoundment will be planted with an approved seed mix to help prevent erosion and promote stability.

j) Top width of the embankment shall be not less than (H+35)/5, where H = Height of Dam in feet.

3.2 Sediment Yield

The Universal Soil Equation (USLE) was used to estimate sediment yield from disturbed areas. All soil loss from this area was assumed to be delivered to, and deposited in the sedimentation pond.

Erosion rate (A) in tons-per-acre-per-year is determined using the USLE as follows:

$$A = (R)\,(K)\,(LS)\,(CP)$$

Where the variables R, K, LS, and CP are defined as follows:

Variable "R" is the rainfall factor which can be estimated from $R = 27P^{2.2}$; where P is the 2-year, 6-hour precipitation value. P for the Lila Canyon area is 0.75" as shown in Figure 5.4, page 315, Barfield, et.al. 1983. Therefore, the estimated value of "R" for this area is <u>14.34</u>.

Variable "K" is the soil erodibility factor. For disturbed areas, the "K" value is conservatively estimated to be <u>0.5</u>. For disturbed runoff, but uncompacted and ungraded areas, "K" is estimated at <u>0.320</u>. "K" is estimated to be <u>0.035</u> for undisturbed areas.

Variable "LS" is the length-slope factor. This figure was determined by applying the slope length and percentage for each sub-drainage area to the chart in Figure 5.15, p. 334, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

Variable "CP" is the control practice factor, which can be divided into a cover and practice factor. Values were determined from Appendix 5A, Barfield, et.al., 1983.

Site	CP Factor
Compacted Areas	1.20
Disturbed/Uncompacted Areas	0.20
Undisturbed Areas	0.15

The sediment volume is based on a density of 100 pounds per cubic foot of sediment.

SEDIMENT YIELD CALCULATIONS - USLE - Sediment Pond #1

Drainage	R	K	Acres	Slope Length Feet	Slope (%)	LS	CP	A	Yield
DA-1a	14.34	0.500	0.33	680	22.35	12.50	1.20	107.55	0.0163
DA-1b	14.34	0.500	0.31	420	11.43	3.30	1.20	28.39	0.0040
DA-1c	14.34	0.500	0.20	225	8.89	1.70	1.20	14.63	0.0013
DA-2a	14.34	0.500	0.93	680	23.82	13.00	1.20	111.85	0.0478
DA-2b	14.34	0.500	0.14	350	10.29	2.80	1.20	24.09	0.0015
DA-2c	14.34	0.500	0.10	106	15.10	2.60	1.20	22.37	0.0010
DA-3	14.34	0.500	0.30	170	9.41	1.60	1.20	13.77	0.0019
DA-4a	14.34								

1405x2271Y0

.500

			0.14	100
DA-4b	14.34	0.500	0.12	270
DA-4c	14.34	0.500	0.60	580
DA-5a	14.34	0.500	0.07	180
DA-5b	14.34	0.500	0.33	125
DA-5c	14.34	0.500	0.42	570
DA-6a	14.34	0.500	0.28	200

Lila Canyon Mine

SEDIMENT YIELD CALCULATI

Drainage	R	K	Acres	Slope Length Feet
DA-14a	14.34	0.500	0.36	390
DA-14b	14.34	0.500	0.75	540
DA-15a	14.34	0.500	0.38	525
DA-15b	14.34	0.500	0.62	270
DA-16a	14.34	0.500	0.16	370
DA-16b	14.34	0.500	0.09	210
DA-17a	14.34	0.500	0.42	610
DA-17b	14.34	0.500	0.07	100
DA-18a	14.34	0.500	0.07	175
DA-18b	14.34	0.500	0.44	650

Lila Canyon Mine

TABL]

Table

Sediment Pon

1. Use 1.90" for 10 year - 24 hour event.

2. Runoff Volume - (from Table 5, 10yr/24hr) +

in/ft) =

3. Sediment Storage Volume

   USLE 0.9491 ac.ft./yr. x 3 yrs. =

4. Total Required Pond Volume

   4.68 + 2.85 =

5. Peak Flow (25 yr. - 6 hr. event)* =

6. Pond Design Volume @ Principle Spillway =

Lila Canyon Mine

TABLI

Table

Sediment

Stage/Volu

Elevation	Area (sq. ft.)	Volume (ac. ft.)	Acc (
5830	22620	0	0.000
5831	26136	24380	0.56
5832	2		

Appendix 7-4
Lila Canyon Mine
Sedimentation and Drainage Control Plan

Revised
January 2001
October 2002 RJM
February 2007 TJS
April 2008 TJS
July 2008 TJS

SEDIMENTATION AND DRAINAGE CONTROL PLAN

TABLE OF CONTENTS

Section **Page Number**

SEDIMENTATION AND DRAINAGE CONTROL PLAN

1- Introduction

The Sedimentation and Drainage Control Plan for the Lila Canyon Mine has been designed according to the State of Utah R645- Coal Mining Rules, November 1, 1996. All design criteria and construction will be certified by a Utah Registered Professional Engineer.

This plan has been divided into the following three sections:

1) Design of Drainage Control Structures for the Proposed Construction

2) Design of Sediment Control Structures

3) Design of Drainage Control Structures for Reclamation

The general surface water control plan for this project will consist of the following:

(a) This is a new site construction. All areas proposed for disturbance will be sloped to drain to surface ditches and/or culverts where runoff will be carried to two sediment ponds. All minesite drainage controls and watersheds are shown on Plate 7-5 "Proposed Sediment Control Map".

(b) The majority of undisturbed runoff will be diverted around the minesite and beneath the sediment pond #1 by properly sized culverts. Undisturbed diversion culvert UC-1, is located on the northwest end of the site. This diversion will allow the majority of undisturbed runoff from the Right Fork of Lila Canyon to bypass the mine area beneath sediment pond #1. All undisturbed diversions are designed to carry runoff from a 100 year - 6 hour precipitation event. UC-1 is oversized at 60" diameter.

(c) Two adequately sized sediment ponds will be constructed at the lower end of the site. These ponds are sized to contain and treat the runoff from all of the disturbed area and any contributing undisturbed areas for a 10 year - 24 hour precipitation event. The ponds will be equipped with C.M.P. culvert principle spillway and decant and CMP culvert emergency spillway sized to safely pass runoff from a 25 year - 6 hour precipitation event. The spillways from sediment pond #1 will discharge into the UC-1 CMP culvert running beneath the pond. This culvert will discharge onto an engineered discharge structure and into the Right Fork of Lila Canyon channel below the minesite. The spillways from sediment pond #2 will discharge onto an engineered discharge structure and into the Middle Fork of Lila Canyon channel below the minesite.

DESIGN OF DRAINAGE CONTROL STRUCTURES

Design Parameters:

Tables:

Figures:

Design Parameters

2.1 Precipitation

The precipitation-frequency values for the area were taken from the approved Mining and Reclamation Plan, Horse Canyon Mine, Emery County, Utah, Volume III, submitted by I.P.A.

Frequency - Duration	Precipitation
10 year - 6 hour	1.30"
10 year - 24 hour	1.90"
25 year - 6 hour	1.50"
100 year - 6 hour	1.90"

2.2 Flow

Peak flows, flow depths, areas and velocities were calculated using the computer program "Office of Surface Mining Watershed Model", Storm Version 6.21 by Gary E. McIntosh. All flows are based on the SCS - TR55 Method for both SCS 6-hour and NOAA Type II, 24-hour storms.

Time of concentration of storm events was calculated for each drainage area using the SCS upland curve method included as part of the Storm software. For the undisturbed areas UA-1 and UA-4 the watershed type was set at forested and the curve condition was set at bare ground. For UA-6a and UA-6b and all DA watersheds, the watershed type was set as disturbed and the curve condition was set at bare ground.

2.3 Velocity

Flow velocities for each ditch structure were calculated using the Storm computer program with Manning's Formula:

$$V = \frac{1.49}{n} R^{2/3} S^{1/3}$$

where:			
	V	=	Velocity (fps)
	R	=	Hydraulic Radius (ft.)
	S	=	Slope (ft. per ft.)
	n	=	Manning's n; Table 3.1, p. 159,

"Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner & Haan, 1983.

Note: The following Manning's n were used in the calculations:

Structure	Manning's n
Culverts (cmp)	0.025
Unlined Disturbed Area Ditches	0.035

2.4 Drainage Areas

All drainage areas were planimetered directly from either Plate 7-1, "Permit Area Hydrology Map", and Plate 7-2, "Disturbed Area Hydrology/Watershed".

2.5 Slopes, Lengths

All slopes and lengths were measured directly from the topography on Plates 7-1 and 7-2.

2.6 Runoff Volume

Runoff was calculated using the SCS Formula for NOAA Type II, 24-hour storms; using the Storm Version 6.21 computer program:

$$Q = \frac{(P - 0.2\,S)^2}{P + 0.8\,S}$$

where:

CN	=	Runoff Curve Number
Q	=	Runoff in inches
P	=	Precipitation in inches
S	=	$\frac{1000}{CN} - 10$

2.7 Runoff Curve Numbers

Two curve numbers were utilized for the undisturbed areas. Areas with milder slopes (less than 30%) were given a runoff curve number of 75. All other undisturbed areas (30% slope or greater) were given a runoff curve number of 83. These numbers were taken directly from the approved "Mining and Reclamation Plan, Horse Canyon Mine, Emery County, Utah, Volume III", submitted by I.P.A. The numbers in that plan were based on vegetation and soils data from on-site.

Two other runoff curve numbers have been used in the calculations. A runoff CN of 90 is used for all disturbed areas (including the areas designated as undisturbed which lie within the disturbed area boundary (See Plate 7-2), and a runoff CN of 95 is used for paved areas. These numbers are based on commonly used and approved values and from Table 2.20, (p. 82, Barfield, et al, 1983).

The following is a summary of runoff curve numbers used in these calculations:

Watershed	Runoff CN
Undisturbed (<30% slopes):	75
Undisturbed (>30% slopes):	83
Disturbed:	90
Paved:	95

2.8 Culvert Sizing

Minimum culvert sizing is based on the either the inlet control nomograph or Manning's Equation. Culverts were evaluated for inlet control conditions to determine the minimum pipe size using the Culvert Nomograph included as Figure 1 of this Appendix. If the pipe had a HW/D ratio equal to or greater than 1.0 or the slope were less than 2% the Haestad Methods, Flowmaster, Version 6.0 computer program was used to determine the pipe flow diameter using:

$$D = \left(\frac{2.16\ Q\ n}{\sqrt{s}}\right)^{0.35}$$

where:	D	=	Required Diameter (feet)
	Q	=	QP = Peak Discharge (cfs)
	n	=	Roughness Factor (0.025 for CMP)
	S	=	Slope (ft. per ft.)

2.9 Culverts

Culverts have been sized according to the calculations previously described, and are shown on Plate 7-5, "Proposed Sediment Control Map". Culverts carrying undisturbed drainages are designated with UC- Letters (i.e. UC-1). All undisturbed area drainage culverts will be fitted with trash racks to minimize plugging by rocks or other debris.

Trash racks will be provided at the inlet for all undisturbed drainage culverts. These will consist of 3/4" steel bars welded on 6" centers across the flared inlet structures of each culvert. Bars will be sloped from the front of the inlet structure up to the top of the culvert. This ramp configuration will allow trash, branches and other potential obstructions to be swept up and away from the inlet rather than being impinged against the grates during a flow event. Rip rap will be placed around the flared inlet structure and above it to a height of at least 6" above the required headwall for each culvert. (See Figure 4 for details). Trash racks will be checked on a routine schedule and following precipitation events and all trash, branches and other obstructions will be removed.

It should be noted that all undisturbed area culverts are adequately sized to handle the expected runoff from a 100 year - 6 hour event for maximum protection of the mine area, sediment pond and undisturbed drainage. This is well in excess of the 10 year - 6 hour event required by the regulations and is proposed as an extra measure of safety.

Disturbed area culverts and ditches are shown on the "Sediment Control Map", Plate 7-5. Culverts carrying disturbed drainage are designated with a DC-number (i.e. DC-1). Calculations for all disturbed area culverts and ditches are also included with this report, along with design criteria. Disturbed drainage areas draining to culverts and ditches are marked with a DA-number (i.e. DA-1). Undisturbed drainage areas are marked with a UA-number (i.e. UA-1).

Culverts will be inspected regularly, and cleaned as necessary to provide for passage of drainage flows. Inlets and outlets shall also be maintained so as to prevent plugging or undue restriction of water flow.

All disturbed area culverts are temporary, and will be removed upon final reclamation.

2.10 Main Canyon Culvert - Outlet Structure

The outlet of culvert UC-1 has been designed to flow onto a rip-rap apron to protect against souring and to allow for energy dissipation. The rip-rap apron is designed to fit the natural channel configuration as closely as possible, and will allow runoff to re-enter the natural channel at a reduced velocity which is no greater than natural flow conditions. Runoff from the 100 year - 6 hour precipitation event in the canyon below the minesite has been calculated at 52.32 cfs, including sediment pond overflow.

The rip-rap apron design is based on Figure 7-26, Design of Outlet Protection - Maximum Tailwater Condition, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983. Based on the figure, the apron should be a minimum of 15' in length, widening from 5' to 9', with a 0.1% slope. The proposed length has been increased to 20', to ensure adequate time for velocity reduction. The apron slope is kept at 0.1%. Rip-rap size is conservatively placed at 12" D_{50}. Rip-rap will be placed to a depth of 1.5 D_{50} and will be placed on a 6" layer of 2" drain rock filter. Rip-rap will also be placed on the 2H:1V side slopes to the height of the culvert (4') at the culvert outlet tapering to 3' at the outlet of the apron. This rip-rap apron has been sized and designed to adequately dissipate energy from flow velocities of a 100 year - 6 hour precipitation event and resist dislodgement. The drain rock filter bed will also serve to secure the rip-rap boulders firmly in place, to add an additional element of stability, and prevent scouring underneath the armored apron. (See Figure 4A for construction details). The natural channel below the culvert has a gradient of approximately 7.76%. When the flow is routed from the culvert across the apron to the natural channel, the velocity is reduced from 4.79 fps at the culvert outlet to 1.50 fps at the outlet of the apron. (See Culvert Outlet Rip-Rap Apron Flow Velocity Calculations in Appendix 1.)

It should be noted that these calculations are based on a <u>100 year - 6 hour event</u>.

2.11 Ditches

All ditches will carry disturbed area drainage to the pond. Ditches are shown on the Proposed Sediment Control Map, Plate 7-5, and are designated with a DD-number (i.e. DD-1 for Disturbed Area Ditches) or UD-number (i.e. UD-1 for Undisturbed Area Ditches).

All ditches are designed to carry the expected runoff from a 10 year - 6 hour event with a minimum freeboard of 0.5' (See Table 8 and Figure 3).

Ditches which exhibit expected flow velocities of 5 fps or greater will be lined with rip-rap. A typical cross-section is shown on Figure 3 and flow depths and areas for all lined and unlined ditches are presented in Table 8 of this report.

Ditch slopes have been determined from Plates 7-2 and 7-5.

All ditches will be inspected regularly, and maintained to the minimum dimensions to provide adequate capacity for the design flow. All ditches are temporary and will be removed as described under the reclamation hydrology section. (Section 4)

TABLE 1

Table 1 Undisturbed Watershed Summary		
Watershed	Drains To	Final
UA-1	UC-1	Lila Canyon
UA-2	DD-2	Sediment Pond
UA-4	Sediment Pond	Sediment Pond
UA-6a	DD-12	Sediment Pond
UA-6b	DD-11	Sediment Pond
UA-7	ASCA Area	Lila Canyon
UA-8	ASCA Area	Lila Canyon

TABLE 2

Table 2
Disturbed Watershed Summary

Watershed	Drains To	Final
DA-1a	DD-1a	Sediment Pond
DA-1b	DD-1b	Sediment Pond
DA-1c	DD-1c	Sediment Pond
DA-2a	DD-2a	Sediment Pond
DA-2b	DD-2b	Sediment Pond
DA-2c	DD-2c	Sediment Pond
DA-3	DD-3	Sediment Pond
DA-4a	DD-4a	Sediment Pond
DA-4b	DD-4b	Sediment Pond
DA-4c	DD-4c	Sediment Pond
DA-5a	DD-5a	Sediment Pond
DA-5b	DD-5b	Sediment Pond
DA-5c	DD-5c	Sediment Pond
DA-6a	DD-6a	Sediment Pond
DA-6b	DD-6b	Sediment Pond
DA-6c	DD-6c	Sediment Pond
DA-7	DD-7	Sediment Pond
DA-8a	DD-8a	Sediment Pond
DA-8b	DD-8b	Sediment Pond
DA-8c	DD-8c	Sediment Pond
DA-9	DD-9	Sediment Pond
DA-10	DD-10	Sediment Pond
DA-11	DD-11	Sediment Pond
DA-13a	DD-13a	Sediment Pond
DA-13b	DD-13d	Sediment Pond
DA-13c	DD-13e	Sediment Pond
DA-14a	DD-14a	Sediment Pond 2
DA-14b	DD-14b	Sediment Pond 2
DA-15a	DD-15a	Sediment Pond 2
DA-15b	DD-15b	Sediment Pond 2
DA-16a	DD-16a	Sediment Pond 2
DA-16b	DD-16b	Sediment Pond 2
DA-17a	DD-17a	Sediment Pond 2
DA-17b	DD-17b	Sediment Pond 2
DA-18a	DD-18a	Sediment Pond 2
DA-18b	DD-18b	Sediment Pond 2
TS-1	Topsoil Berm	Sediment Pond
POND	Sediment Pond	Sediment Pond

TABLE 3

Table 3 Watershed Parameters					
Watershed	Area (Acre)	Hydraulic Length (ft.)	Elevation Change (ft.)	% Slope	CN
Undisturbed Watersheds					
UA-1	248.41	5200	1480	28.46	75
UA-2	10.01	1500	1000	66.67	83
UA-4	14.08		595	47.76	83
	1.45	230	80	34.70	90
UA-6b	0.40	90	30	33.33	90
UA-7	0.60	195	25	12.80	90
UA-8	0.37	100	30	30.00	90
Disturbed Watersheds					
DA-1a	0.33	680	152	22.35	95
DA-1b	0.31	420	48	11.43	95
DA-1c	0.20	225	20	8.89	95
DA-2a	0.93	680	162	23.82	95
DA-2b	0.14	350	36	10.29	95
DA-2c	0.10	106	16	15.10	95
DA-3	0.30	170	16	9.41	90
DA-4a	0.14	100	12	12.00	95
DA-4b	0.12	270	28	10.37	95
DA-4c	0.60	580	54	9.31	95
DA-5a	0.07	180	24	13.33	95
DA-5b	0.33	125	14	11.20	90
DA-5c	0.42	570	54	9.47	95
DA-6a	0.28		54	27.	90
DA-6b	3.35	760	70	9.21	90
DA-6c	2.51	690	70	10.14	90
DA-7	2.68	630	30	4.76	95
DA-8a	0.26	284	54	19.01	90
DA-8b	0.76	670	52	7.80	90
DA-8c	0.95	410	42	10.24	90
DA-9	0.05	50	6	12.00	95
DA-10	2.89	700	20	2.86	95
DA-11	0.78	340	16	4.70	95
DA-13a	1.97	470	12	2.55	95
DA-13b	0.49	280	4	1.43	90
DA-13c	0.40	460	22	4.78	90
DA-14a	0.36	390	34	8.71	95

TABLE 3 (Continued)

Table 3 Watershed Parameters					
Watershed	Area (Acre)	Hydraulic Length (ft.)	Elevation Change (ft.)	% Slope	CN
Disturbed Watersheds					
DA-14b	0.75	540	16	2.96	95
DA-15a	0.38	525	50	9.52	95
DA-15b	0.62	270	12	4.44	95
DA-16a	0.16	370	10	2.70	95
DA-16b	0.09	210	13	6.19	95
DA-17a	0.42	610	19	3.11	95
DA-17b	0.07	100	5	5.00	95
DA-18a	0.07	175	6	3.43	95
DA-18b	0.44	650	24	3.69	95
TS-1	2.95	660	38	5.75	83
POND	1.92	380	50	13.16	95

TABLE 4

Table 4
Runoff Summary
Undisturbed Watersheds (Not Draining to Ponds)

Watershed	10 yr. / 6 hr. Peak Flow - cfs	25 yr. / 6 hr. Peak Flow - cfs	100 yr. / 6 hr. Peak Flow - cfs	10 yr. / 24 hr. Peak Flow - cfs	10 yr. / 24 hr. Volume - ac.ft.
UA-1	7.02	10.31	20.48	25.53	6.90
UA-7	0.21	0.27	0.40	0.43	0.03
UA-8	0.14	0.18	0.26	0.14	0.03

TABLE 5

Table 5
Runoff Summary
Watershed Drainage to Sediment Pond

Watershed	10 yr. / 6 hr. Peak Flow-cfs	25 yr. / 6 hr. Peak Flow-cfs	10 yr. / 24 hr. Peak Flow-cfs	10 yr. / 24 hr. Volume-ac-ft
Undisturbed Watersheds draining to Pond #1				
UA-2	2.11	3.11	6.11	0.52
UA-4	3.14	4.65	9.20	0.74
UA-6a	0.47	0.60	0.95	0.12
UA-6b	0.10	0.13	0.21	0.03
Disturbed Watersheds draining to Pond #1				
DA-1a	0.22	0.26	0.37	0.04
DA-1b	0.20	0.24	0.33	0.04
DA-1c	0.11	0.14	0.19	0.02
DA-2a	0.61	0.73	1.03	0.11
DA-2b	0.09	0.10	0.15	0.02
DA-2c	0.04	0.05	0.08	0.01
DA-3	0.11	0.14	0.21	0.03
DA-4a	0.06	0.08	0.11	0.02
DA-4b	0.07	0.08	0.12	0.01
DA-4c	0.42	0.51	0.71	0.07
DA-5a	0.05	0.06	0.09	0.01
DA-5b	0.11	0.14	0.21	0.03
DA-5c	0.29	0.35	0.49	0.05
DA-6a	0.09	0.12	0.18	0.02
DA-6b	1.60	2.06	3.27	0.28
DA-6c	1.18	1.52	2.40	0.21
DA-7	1.98	2.39	3.36	0.31
DA-8a	0.10	0.12	0.19	0.02
DA-8b	0.36	0.47	0.74	0.06
DA-8c	0.40	0.52	0.81	0.08
DA-9	0.04	0.05	0.07	0.01
DA-10	2.19	2.65	3.73	0.33
DA-11	0.52	0.63	0.89	0.09
DA-13a	1.46	1.76	2.47	0.23
DA-13b	0.23	0.30	0.47	0.04
DA-13c	0.19	0.24	0.38	0.03
TS-1	0.65	0.96	1.90	0.15
POND	1.18	1.42	1.99	0.22
TOTAL		26.58		3.95

TABLE 5 (Continued)

Table 5
Runoff Summary
Watershed Drainage to Sediment Pond

Watershed	10 yr. / 6 hr. Peak Flow-cfs	25 yr. / 6 hr. Peak Flow-cfs	10 yr. / 24 hr. Peak Flow-cfs	10 yr. / 24 hr. Volume-ac-ft
Disturbed Watersheds draining to Pond #2				
DA-14a	0.23	0.28	0.39	0.04
DA-14b	0.56	0.67	0.95	0.09
DA-15a	0.26	0.31	0.44	0.04
DA-15b	0.40	0.48	0.67	0.07
DA-16a	0.11	0.14	0.19	0.02
DA-16b	0.06	0.07	0.10	0.01
DA-17a	0.31	0.38	0.53	0.05
DA-17b	0.05	0.06	0.09	0.01
DA-18a	0.06	0.07	0.10	0.01
DA-18b	0.33	0.40	0.56	0.05
TOTAL		2.86		0.

TABLE 6

Table 6
Runoff Control Structure
Watershed Summary

Structure	Type	Contributing Watersheds/Structures
UC-1	Culvert	UA-1, UA-7, Sediment Pond Overflow
DD-1a	Ditch	DA-1a
DD-1b	Ditch	DD-1a, DA-1b, UA-6b
DC-2	Culvert	DD-1b
DD-1c	Ditch	DC-2, DA-1c
DD-2a	Ditch	DA-2a, UA-2
DD-2b	Ditch	DD-2a, DA-2b
DC-1	Culvert	DD-2b, UA-2
DD-2c	Ditch	DC-1, DA-2c
DC-3	Culvert	DD-2c
DD-3	Ditch	DA-3
DC-4	Culvert	DD-3
DD-4a	Ditch	DA-4a
DD-4b	Ditch	DD-4a, DC-4, DA-4b
DC-20	Culvert	DD-4b
DD-4c	Ditch	Dc-20, DA-4c
DC-9	Culvert	DD-4c
DD-5a	Ditch	DA-5a
DD-5b	Ditch	DD-5a, DA-5b
DC-5	Culvert	DD-5b
DD-5c	Ditch	DC-5, DA-5c
DC-10	Culvert	DD-5c, DC-9
DD-6a	Ditch	DC-3, DD-1c, DA-6a

Table 6 Runoff Control Structure Watershed Summary		
Structure	Type	Contributing Watersheds/Structures
DC-6	Culvert	DD-6a
DD-6b	Ditch	DC-6, DA-6b
DD-6c	Ditch	DA-6c
DC-8	Culvert	DD-6b, DD-6c
DD-7	Ditch	DA-7
DC-7	Culvert	DD-7
DD-8a	Ditch	DA-8a
DD-8b	Ditch	DD-8a, DC-7, DA-8b
DD-8c	Ditch	DD-8b, DC-8, DA-8c
DD-9	Ditch	DC-10, DD-5c, DA-9
DC-11	Culvert	DD-9
DD-10	Ditch	DA-10
DC-12	Culvert	DD-10
DD-11	Ditch	DA-11
DD-12	Ditch	DD-7, UA-6a
DD-13a	Ditch	DC-11, DA-13a
DD-13b	Ditch	DD-13a, DD-11
DD-13c	Ditch	DD-13b, DC-12
DD-13d	Ditch	DD-13c, DD-8c, DD-13b
DC-13	Culvert	DD-13d
DD-13e	Ditch	DC-13, DA-13c
DD-14a	Ditch	DA-14a
DD-14b	Ditch	DA-14b
DC-14	Culvert	DD-14a, DD-14b
DD-15a	Ditch	DA-15a

Table 6
Runoff Control Structure
Watershed Summary

Structure	Type	Contributing Watersheds/Structures
DD-15b	Ditch	DD-15a, DA-15b
DC-19	Culvert	DD-15b
DD-16a	Ditch	DA-16a
DC-15	Culvert	DD-16a
DD-16b	Ditch	DC-15, DA-16b
DD-17a	Ditch	DA-17a
DC-16	Culvert	DD-17a
DD-17b	Ditch	DC-16, DC-14, DA-17b
DC-17	Culvert	DD-17b, DD-16b
DD-18a	Ditch	DA-18a
DC-18	Culvert	DD-18a
DD-18b	Ditch	DC-18, DA-18b

DD-12 does not exist.

TABLE 7

Table 7 Runoff Control Structure Flow Summary					
Structure	Type	10yr. / 6hr. Peak Flow-cfs	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs
UC-1	Culvert	38.67	57.40	42.02	52.32
DD-1a	Ditch	0.22	0.37	0.26	- -
DD-1b	Ditch	0.52	0.91	0.63	- -
DC-2	Culvert	0.52	0.91	0.63	- -
DD-1c	Ditch	0.63	1.10	0.77	- -
DD-2a	Ditch	2.72	7.14	3.84	- -
DD-2b	Ditch	2.81	7.29	3.94	- -
DC-1	Culvert	2.81	7.29	3.94	- -
DD-2c	Ditch	2.85	7.37	3.99	- -
DC-3	Culvert	2.85	7.37	3.99	- -
DD-3	Ditch	0.11	0.21	0.14	- -
DC-4	Culvert	0.11	0.21	0.14	- -
DD-4a	Ditch	0.06	0.11	0.08	- -
DD-4b	Ditch	0.24	0.44	0.30	- -
DC-20	Culvert	0.24	0.44	0.30	- -
DD-4c	Ditch	0.66	1.15	0.81	- -
DC-9	Culvert	0.66	1.15	0.81	- -
DD-5a	Ditch	0.05	0.09	0.06	- -
DD-5b	Ditch	0.16	0.30	0.20	- -
DC-5	Culvert	0.16	0.30	0.20	- -
DD-5c	Ditch	0.45	0.79	0.55	- -
DC-10	Culvert	1.11	1.94	1.36	- -
DD-6a	Ditch	2.94	7.55	4.11	- -

Table 7 Runoff Control Structure Flow Summary					
Structure	Type	10yr. / 6hr. Peak Flow-cfs	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs
DC-6	Culvert	2.94	7.55	4.11	--
DD-6b	Ditch	4.54	10.82	6.17	--
DD-6c	Ditch	1.18	2.40	1.52	--
DC-8	Culvert	5.72	13.22	7.69	--
DD-7	Ditch	2.45	4.31	2.99	--
DC-7	Culvert	2.45	4.31	2.99	--
DD-8a	Ditch	0.10	0.19	0.12	--
DD-8b	Ditch	2.91	5.24	3.58	--
DD-8c	Ditch	6.12	14.03	8.21	--
DD-9	Ditch	0.04	2.80	1.96	--
DC-11	Culvert	1.60	2.80	1.96	--
DD-10	Ditch	2.19	3.73	2.65	--
DC-12	Culvert	2.19	3.73	2.65	--
DD-11	Ditch	0.52	0.89	0.63	--
DD-13a	Ditch	3.06	5.27	3.72	--
DD-13b	Ditch	3.58	6.16	4.35	--
DD-13c	Ditch	5.77	9.89	7.00	--
DD-13d	Ditch	6.35	14.50	8.51	--
DC-13	Culvert	6.35	14.50	8.51	--
DD-13e	Ditch	6.54	14.88	8.75	--
DD-14a	Ditch	0.23	0.39	0.28	--
DD-14b	Ditch	0.56	0.95	0.67	--
DC-14	Culvert	0.79	1.34	0.95	--
DD-15a	Ditch	0.26	0.44	0.31	--

Table 7 Runoff Control Structure Flow Summary					
Structure	Type	10yr. / 6hr. Peak Flow-cfs	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs
DD-15b	Ditch	0.66	1.11	0.79	- -
DC-19	Culvert	0.66	1.11	0.79	- -
DD-16a	Ditch	0.11	0.19	0.14	- -
DC-15	Culvert	0.11	0.19	0.14	- -
DD-16b	Ditch	0.17	0.29	0.21	- -
DD-17a	Ditch	0.31	0.53	0.38	- -
DC-16	Culvert	0.31	0.53	0.38	- -
DD-17b	Ditch	1.15	1.96	1.39	- -
DC-17	Culvert	1.32	2.25	1.60	- -
DD-18a	Ditch	0.06	0.10	0.07	- -
DC-18	Culvert	0.06	0.10	0.07	- -
DD-18b	Ditch	0.39	0.66	0.47	- -

DD-12 does not exist.
UC-1flow values include 25yr-6hr sediment pond peak flow 31.44 cfs.

TABLE 8

Table 8 Disturbed Ditch Design Summary						
Ditch	DD-1a	DD-1b	DD-1c	DD-2a	DD-2b	DD-2c
Slope (%)	11.42	11.20	10.00	12.06	10.29	14.29
Length (ft.)	683	420	20	680	350	105
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	0.00	0.00	0.00	2.00	2.00	2.00
Peak Flow 10/6 (cfs)	0.22	0.52	0.63	2.72	2.81	2.85
Peak Flow 10/24 (cfs)	0.37	0.91	1.10	7.14	7.29	7.37
Flow Depth (ft.) 10/6	0.20	0.27	0.30	0.23	0.24	0.22
Flow Depth (ft.) 10/24	0.24	0.34	0.37	0.39	0.42	0.38
Flow Area (ft.^{2}) 10/6	0.08	0.15	0.18	0.56	0.61	0.55
Flow Area (ft.^{2}) 10/24	0.11	0.23	0.27	1.10	1.18	1.06
Velocity (fps) 10/6	2.84	3.49	3.51	4.81	4.61	5.18
Velocity (fps) 10/24	3.23	4.02	4.04	6.49	6.18	6.96
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N
Rip-Rap D_{50}	-	-	-	-	-	-
Note: Slope/Lengths from Plate 7-2.						

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-3	DD-4a	DD-4b	DD-4c	DD-5a	DD-5b	DD-5c
Slope (%)	0.60	11.00	10.26	10.00	13.11	11.11	9.52
Length (ft.)	171	100	273	580	183	126	567
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peak Flow 10/6 (cfs)	0.11	0.06	0.24	0.66	0.05	0.16	0.45
Peak Flow 10/24 (cfs)	0.21	0.11	0.44	1.15	0.09	0.30	0.79
Flow Depth (ft.) 10/6	0.26	0.12	0.21	0.30	0.11	0.18	0.27
Flow Depth (ft.) 10/24	0.34	0.15	0.26	0.38	0.14	0.22	0.33
Flow Area (ft.^{2}) 10/6	0.14	0.03	0.09	0.19	0.02	0.06	0.14
Flow Area (ft.^{2}) 10/24	0.23	0.05	0.14	0.28	0.04	0.10	0.22
Velocity (fps) 10/6	0.79	2.02	2.79	3.55	2.06	2.59	3.17
Velocity (fps) 10/24	0.93	2.35	3.24	4.08	2.39	3.04	3.65
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N
Rip-Rap D_{50}	-	-	-	-	-	-	-
Note: Slope/Lengths from Plate 7-2.							

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-6a	DD-6b	DD-6c	DD-7	DD-8a	DD-8b	DD-8c
Slope (%)	18.00	2.56	3.38	1.08	20.42	7.81	10.34
Length (ft.)	200	507	532	370	284	666	406
Manning's No.	0.040	0.035	0.035	0.035	0.035	0.035	0.040
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	3.00	1.00	1.00	1.00	0.00	1.00	2.00
Peak Flow 10/6 (cfs)	2.94	4.54	1.18	2.45	0.10	2.91	6.12
Peak Flow 10/24 (cfs)	7.55	10.82	2.40	4.31	0.19	5.24	14.03
Flow Depth (ft.) 10/6	0.19	0.60	0.28	0.55	0.13	0.37	0.41
Flow Depth (ft.) 10/24	0.32	0.90	0.41	0.72	0.17	0.49	0.63
Flow Area ($ft.^2$) 10/6	0.62	1.32	0.45	1.15	0.03	0.63	1.14
Flow Area ($ft.^2$) 10/24	1.17	2.52	0.75	1.75	0.06	0.98	2.07
Velocity (fps) 10/6	4.71	3.43	2.64	2.12	2.90	4.59	5.35
Velocity (fps) 10/24	6.47	4.29	3.21	2.46	3.40	5.37	6.78
Rip-Rap Req'd (Y/N)	Y	N	N	N	N	N	Y
Rip-Rap D_{50}	6"	-	-	-	-	-	6"
Note: Slope/Lengths from Plate 7-2.							

TABLE 8 (Continued)

Table 8 (Continued)
Disturbed Ditch Design Summary

Ditch	DD-9	DD-10	DD-11	DD-13a	DD-13b	DD-13c	DD-13d
Slope (%)	10.00	3.02	5.06	2.53	3.23	3.30	1.25
Length (ft.)	50	696	336	474	62	38	278
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	0.00	1.00	0.00	1.00	1.00	1.00	3.00
Peak Flow 10/6 (cfs)	0.04	2.19	0.52	3.06	3.58	5.77	6.35
Peak Flow 10/24 (cfs)	0.07	3.73	0.89	5.27	6.16	9.89	14.50
Flow Depth (ft.) 10/6	0.11	0.40	0.32	0.50	0.51	0.63	0.57
Flow Depth (ft.) 10/24	0.13	0.53	0.39	0.65	0.66	0.82	0.89
Flow Area (ft.^{2}) 10/6	0.02	0.73	0.20	0.99	1.02	1.44	2.36
Flow Area (ft.^{2}) 10/24	0.03	1.08	0.30	1.48	1.52	2.15	4.25
Velocity (fps) 10/6	1.76	3.00	2.59	3.08	3.51	4.01	2.69
Velocity (fps) 10/24	2.03	3.46	2.97	3.55	4.05	4.61	3.41
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N
Rip-Rap D_{50}	-	-	-	-	-	-	-

Note: Slope/Lengths from Plate 7-2.

TABLE 8 (Continued)

Table 8 (Continued)
Disturbed Ditch Design Summary

Ditch	DD-13e	DD-14a	DD-14b	DD-15a	DD-15b	DD-16a	DD-16b
Slope (%)	4.78	8.72	3.15	9.70	4.07	2.97	6.06
Length (ft.)	460	390	540	525	270	370	165
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	3.00	0.00	0.00	0.00	0.00	0.00	0.00
Peak Flow 10/6 (cfs)	6.54	0.23	0.56	0.26	0.66	0.11	0.17
Peak Flow 10/24 (cfs)	14.88	0.39	0.95	0.44	1.11	0.19	0.29
Flow Depth (ft.) 10/6	0.40	0.21	0.36	0.22	0.36	0.20	0.20
Flow Depth (ft.) 10/24	0.63	0.26	0.43	0.26	0.44	0.24	0.25
Flow Area ($ft.^2$) 10/6	1.52	0.09	0.25	0.09	0.26	0.08	0.08
Flow Area ($ft.^2$) 10/24	2.68	0.13	0.38	0.14	0.38	0.12	0.12
Velocity (fps) 10/6	4.31	2.59	2.21	2.78	2.54	1.44	2.10
Velocity (fps) 10/24	5.54	2.96	2.52	3.18	2.89	1.65	2.40
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N
Rip-Rap D_{50}	-	-	-	-	-	-	-

Note: Slope/Lengths from Plate 7-2.

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-17a	DD-17b	DD-18a	DD-18b			
Slope (%)	2.68	4.12	2.86	3.54			
Length (ft.)	485	97	175	650			
Manning's No.	0.035	0.035	0.035	0.035			
Side Slope (H:V)	2:1	2:1	2:1	2:1			
*Bottom Width (ft.)	0.00	0.00	0.00	0.00			
Peak Flow 10/6 (cfs)	0.31	1.15	0.06	0.39			
Peak Flow 10/24 (cfs)	0.53	1.96	0.10	0.66			
Flow Depth (ft.) 10/6	0.29	0.44	0.16	0.30			
Flow Depth (ft.) 10/24	0.36	0.54	0.19	0.37			
Flow Area (ft.^{2}) 10/6	0.17	0.39	0.05	0.18			
Flow Area (ft.^{2}) 10/24	0.26	0.59	0.07	0.27			
Velocity (fps) 10/6	1.80	2.93	1.22	2.11			
Velocity (fps) 10/24	2.05	3.35	1.39	2.41			
Rip-Rap Req'd (Y/N)	N	N	N	N			
Rip-Rap D_{50}	-	-	-	-			
Note: Slope/Lengths from Plate 7-2.							

TABLE 9

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-1	DC-2	DC-3	DC-4	DC-5	DC-6
Slope (%)	13.33	10.77	3.03	21.50	12.00	5.00
Length (ft.)	30	65	33	135	50	80
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	2.81	0.52	2.85	0.11	0.16	2.94
Peak Flow 10/24 (cfs)	7.29	0.91	7.37	0.21	0.30	7.55
Diam. Proposed (ft.)	1.50	1.50	1.50	1.50	1.50	2.00
Velocity (fps) 10/24	10.72	5.31	5.94	4.35	3.95	7.27
Rip-Rap D_{50}	6"	6"	6"	N/A	N/A	6"
Note: Slope/Lengths from Plate 7-5. Velocity: (Haestad Methods, Flowmaster, Version 6.0)						

TABLE 9 (Continued)

Table 9
Disturbed Culvert Design Summary

Culvert	DC-7	DC-8	DC-9	DC-10	DC-11	DC-12
Slope (%)	46.40	38.80	5.70	14.25	4.60	4.00
Length (ft.)	110	85	35	55	65	50
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	2.45	5.72	0.66	1.11	1.60	2.19
Peak Flow 10/24 (cfs)	4.31	13.22	1.15	1.94	2.80	3.73
Diam. Proposed (ft.)	1.50	2.00	1.50	1.50	1.50	1.50
Velocity (fps) 10/24	14.05	17.69	4.55	7.33	5.44	5.60
Rip-Rap D_{50}	12"	12"	N/A	6"	6"	6"

Note: Slope/Lengths from Plate 7-5.
Velocity: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 9 (Continued)

Table 9
Disturbed Culvert Design Summary

Culvert	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18
Slope (%)	3.33	3.33	3.33	3.33	4.00	5.70
Length (ft.)	30	60	60	60	75	35
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	6.35	0.79	0.11	0.31	1.32	0.06
Peak Flow 10/24 (cfs)	14.50	1.34	0.19	0.53	2.25	0.10
Diam. Proposed (ft.)	2.00	1.50	1.50	1.50	1.50	1.50
Velocity (fps) 10/24	7.34	3.93	2.20	2.99	4.87	2.19
Rip-Rap D_{50}	6"	N/A	N/A	N/A	N/A	N/A

Note: Slope/Lengths from Plate 7-5.
Velocity: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 9 (Continued)

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-19					
Slope (%)	2.50					
Length (ft.)	40					
Manning's No.	0.025					
Peak Flow 10/6 (cfs)	0.66					
Peak Flow 10/24 (cfs)	1.11					
Diam. Proposed (ft.)	1.50					
Velocity (fps) 10/24	3.36					
Rip-Rap D_{50}	N/A					

Note: Slope/Lengths from Plate 7-5.
Source: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 10

Table 10
Undisturbed Culvert Design Summary

Culvert	UC-1	
Slope (%)	0.50	
Length (ft.)	480	
Manning's No.	0.025	
Peak Flow 10/6 (cfs)	38.67	
Peak Flow 100/6 (cfs)	52.32	
Diam. Proposed (ft.)	4.00	
Velocity (fps) 100/6	4.79	

* Note: Peak Flows include 25 year - 6 hour design overflow 31.44 cfs from sediment pond.

DESIGN OF SEDIMENT CONTROL STRUCTURES

Design Specifications:

Tables:

Figures:

3.1 Design and Construction Specifications for Sedimentation Pond

a) All construction of sedimentation ponds will be performed under the direction of a qualified, registered professional engineer.

b) The sediment pond #1 will be located in an existing low area where the Right Fork of Lila Canyon passes beneath the existing road. The existing road fill and culvert will be removed, and the pond embankment (road fill) will be reconstructed and compacted. The existing culvert will be replaced with UC-1 which will extend approximately 300' up the Right Fork of Lila Canyon. This culvert will be equipped with an inlet section and trash rack, and will allow undisturbed runoff and treated access road drainage to pass beneath the sediment pond. The majority of the pond will be in an existing channel area, and is therefore considered incised. The embankment will be reconstructed to a maximum of 2h:1v slopes, with the total of inside and outside slopes not less than 5h:1v. The pond will be equipped with a culvert riser principal spillway with an oil skimmer, a decant, and a second culvert riser emergency spillway with an oil skimmer. Both spillways will discharge to the oversized (60") CMP culvert running beneath the pond.

c) The area of pond constructed shall be examined for topsoil, and where present in removable quantities, such soil shall be removed separately and stored in an approved topsoil storage location.

d) In areas where fill is to be placed for the pond impoundment structures, natural ground shall be removed to at least 12" below the base of the structure.

e) Native materials shall be used where practical. Fill will be placed in lifts not to exceed 6" and compacted prior to placement of next lift. Compaction of all fill materials shall be at least 95%.

f) Rip-rap or other protection (culverts, concrete, etc.) will be placed at all pond inlets to prevent scouring. Rip-rap will consist of substantial, angular (non-slaking) rock material of adequate size.

g) Decanting of the pond, as required, will be accomplished by use of a decant pipe with an inverted inlet as shown on Plate 7-6. Samples will be collected prior to decanting of the pond. If the quality of the water meets the requirements of the U.P.D.E.S. Permit, decanting will proceed. Discharge samples will be collected as per the approved U.P.D.E.S. Discharge Permit.

h) Slopes of the embankments shall not be steeper than 2h:1v, inside or outside, with a total of the inslope and outslope not less than 5h:1v, except where areas of the pond are incised.

i) External slopes of the impoundment will be planted with an approved seed mix to help prevent erosion and promote stability.

j) Top width of the embankment shall be not less than (H+35)/5, where H = Height of Dam in feet.

3.2 Sediment Yield

The Universal Soil Equation (USLE) was used to estimate sediment yield from disturbed areas. All soil loss from this area was assumed to be delivered to, and deposited in the sedimentation pond.

Erosion rate (A) in tons-per-acre-per-year is determined using the USLE as follows:

$$A = (R)\,(K)\,(LS)\,(CP)$$

Where the variables R, K, LS, and CP are defined as follows:

Variable "R" is the rainfall factor which can be estimated from $R = 27P^{2.2}$; where P is the 2-year, 6-hour precipitation value. P for the Lila Canyon area is 0.75" as shown in Figure 5.4, page 315, Barfield, et.al. 1983. Therefore, the estimated value of "R" for this area is 14.34.

Variable "K" is the soil erodibility factor. For disturbed areas, the "K" value is conservatively estimated to be 0.5. For disturbed runoff, but uncompacted and ungraded areas, "K" is estimated at 0.320. "K" is estimated to be 0.035 for undisturbed areas.

Variable "LS" is the length-slope factor. This figure was determined by applying the slope length and percentage for each sub-drainage area to the chart in Figure 5.15, p. 334, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

Variable "CP" is the control practice factor, which can be divided into a cover and practice factor. Values were determined from Appendix 5A, Barfield, et.al., 1983.

Site	CP Factor
Compacted Areas	1.20
Disturbed/Uncompacted Areas	0.20
Undisturbed Areas	0.15

The sediment volume is based on a density of 100 pounds per cubic foot of sediment.

SEDIMENT YIELD CALCULATIONS - USLE - Sediment Pond #1

Drainage	R	K	Acres	Slope Length Feet	Slope (%)	LS	CP	A	Yield
DA-1a	14.34	0.500	0.33	680	22.35	12.50	1.20	107.55	0.0163
DA-1b	14.34	0.500	0.31	420	11.43	3.30	1.20	28.39	0.0040
DA-1c	14.34	0.500	0.20	225	8.89	1.70	1.20	14.63	0.0013
DA-2a	14.34	0.500	0.93	680	23.82	13.00	1.20	111.85	0.0478
DA-2b	14.34	0.500	0.14	350	10.29	2.80	1.20	24.09	0.0015
DA-2c	14.34	0.500	0.10	106	15.10	2.60	1.20	22.37	0.0010
DA-3	14.34	0.500	0.30	170	9.41	1.60	1.20	13.77	0.0019
DA-4a	14.34	0.500	0.14	100	12.00	1.80	1.20	15.49	0.0010
DA-4b	14.34	0.500	0.12	270	10.37	2.40	1.20	20.65	0.0011
DA-4c	14.34	0.500	0.60	580	9.31	2.70	1.20	23.23	0.0064
DA-5a	14.34	0.500	0.07	180	13.33	2.80	1.20	24.09	0.0008
DA-5b	14.34	0.500	0.33	125	11.20	1.80	1.20	15.49	0.0023
DA-5c	14.34	0.500	0.42	570	9.47	3.00	1.20	25.81	0.0050
DA-6a	14.34	0.500	0.28	200	27.00	9.50	1.20	81.74	0.0105
DA-6b	14.34	0.500	3.35	710	9.21	3.20	1.20	27.53	0.0423
DA-6c	14.34	0.500	2.51	690	10.14	3.60	1.20	30.97	0.0357
DA-7	14.34	0.500	2.68	630	4.76	1.25	1.20	10.76	0.0132
DA-8a	14.34	0.500	0.26	284	19.01	4.80	1.20	41.30	0.0049
DA-8b	14.34	0.500	0.76	670	7.80	2.40	1.20	20.65	0.0072
DA-8c	14.34	0.500	0.95	410	10.24	2.80	1.20	24.09	0.0105
DA-9	14.34	0.500	0.05	50	12.00	1.35	1.20	11.62	0.0003
DA-10	14.34	0.500	2.89	700	2.86	0.43	0.01	0.03	0.0000
DA-11	14.34	0.500	0.78	340	4.70	0.85	1.20	7.31	0.0026
DA-13a	14.34	0.500	1.97	470	2.55	0.38	0.01	0.03	0.0000
DA-13b	14.34	0.500	0.49	280	1.43	0.22	1.20	1.89	0.0004
DA-13c	14.34	0.500	0.40	460	4.78	1.05	1.20	9.03	0.0017
UA-2	14.34	0.500	10.01	1500	66.67	75.00	0.15	80.66	0.3707
UA-4	14.34	0.500	14.08	1950	47.76	50.00	0.15	53.78	0.3476
UA-6a	14.34	0.500	1.45	230	34.70	15.00	0.15	16.13	0.0107
UA-6b	14.34	0.500	0.40	90	33.33	9.00	0.15	9.68	0.0018

Total Sediment 1 year (ac.ft.) 0.9491

Total Sediment 3 years (ac. ft.) 2.8473

* Disturbed Runoff / Uncompacted Area
** Paved Areas

SEDIMENT YIELD CALCULATIONS - USLE - Sediment Pond #2

Drainage	R	K	Acres	Slope Length Feet	Slope (%)	LS	CP	A	Yield
DA-14a	14.34	0.500	0.36	390	8.71	2.25	1.20	19.36	0.0032
DA-14b	14.34	0.500	0.75	540	2.96	0.44	1.20	3.79	0.0013
DA-15a	14.34	0.500	0.38	525	9.52	3.40	1.20	29.25	0.0051
DA-15b	14.34	0.500	0.62	270	4.44	0.62	1.20	5.33	0.0015
DA-16a	14.34	0.500	0.16	370	2.70	0.38	1.20	3.27	0.0002
DA-16b	14.34	0.500	0.09	210	6.19	1.05	1.20	9.03	0.0004
DA-17a	14.34	0.500	0.42	610	3.11	0.50	1.20	4.30	0.0008
DA-17b	14.34	0.500	0.07	100	5.00	0.54	1.20	4.65	0.0002
DA-18a	14.34	0.500	0.07	175	3.43	0.40	1.20	3.44	0.0001
DA-18b	14.34	0.500	0.44	650	3.69	0.65	1.20	5.59	0.0011
Total									0.014

Total Sediment 1 year (ac.ft.) 0.014

Total Sediment 3 years (ac. ft.) 0.042

* Disturbed Runoff / Uncompacted Area

** Paved Areas

3.3 Sediment Pond Volume

The volumes shown in Tables 11a and 11b are from the volumes calculated from the precipitation, runoff and sediment yield for a 10 year-24 hour precipitation event. The volumes were calculated based on the disturbed areas (and contributing undisturbed areas) runoff values, developed using the design parameters described in this section.

TABLE 11a

Table 11a Sediment Pond #1 Design	
1. Use 1.90" for 10 year - 24 hour event.	
2. Runoff Volume - (from Table 5, 10yr/24hr) + (8.73 ac *1.01 ac-in /12 in/ft) =	4.68 ac-ft (1)
3. Sediment Storage Volume USLE 0.9491 ac.ft./yr. x 3 yrs. =	2.85 ac-ft
4. Total Required Pond Volume 4.68 + 2.85 =	7.53 ac-ft
5. Peak Flow (25 yr. - 6 hr. event)* =	31.44 cfs (2)
6. Pond Design Volume @ Principle Spillway = (See Table 12a)	8.060 ac-ft
* Peak Flow values from Table 5, sum of all contributing watersheds plus possible future flow from UA-1.	

(1) Capacity is 0.73 ac-ft higher than Table 5. This includes flow from undisturbed portion of UA-1 within mine boundary. There is a possibility that the undisturbed area may be needed if the surface facilities were to be expanded.

(2) Peak flow is 7.65 cfs higher that Table 5. This is to allow for flow from UA-5. There is a possibility that UA-5 may be needed if the surface facilities were to be expanded.

TABLE 12a

Table 12a
Sediment Pond #1
Stage/Volume Data

Elevation	Area (sq. ft.)	Volume (ac. ft.)	Acc. Volume (ac. ft.)	Remarks
5830	22620	0	0.000	Bottom of Pond
5831	26136	24380	0.56	
5832	29460	27800	1.20	
5833	31340	30400	1.90	
5834	33260	32300	2.64	Sediment Cleanout Level
5835	35250	34255	3.42	Decant
5836	37240	36245	4.26	
5837	39320	38280	5.13	
5838	41400	40360	6.06	
5839	43550	42475	7.04	
5840	45700	44625	8.06	Principal Spillway
5841	47950	46825	9.14	Emergency Spillway
5842	50200	49075	10.26	
5843	55000	52600	11.47	Top of Embankment

TABLE 11b

Table 11b Sediment Pond #2 Design	
1. Use 1.90" for 10 year - 24 hour event.	
2. Runoff Volume - (from Table 5, 10yr/24hr) =	0.39 ac-ft.
3. Sediment Storage Volume USLE 0.014 ac.ft./yr. x 3 yrs. =	0.04 ac-ft
4. Total Required Pond Volume 0.39 + 0.04 =	0.43 ac-ft
5. Peak Flow (25 yr. - 6 hr. event)* =	2.86 cfs
6. Pond Design Volume @ Principle Spillway = (See Table 12b)	0.60 ac-ft
* Peak Flow values from Table 5, sum of all contributing watersheds.	

TABLE 12b

Table 12b Sediment Pond #2 Stage/Volume Data				
Elevation	Area (sq. ft.)	Volume (sq. ft.)	Acc. Volume (ac. ft.)	Remarks
5838	3560	0	0.00	Bottom of Pond
5838.4		1740	0.04	Sediment Cleanout Level
5838.6		2610	0.06	Decant
5839	4205	3882	0.09	
5840	4850	4527	0.19	
5841	5565	5207	0.31	
5842	6280	5922	0.45	Principal Spillway
5843	7055	6667	0.60	Emergency Spillway
5844	7830	7442	0.77	Top of Embankment

TABLE 13a

Table 13a Sediment Pond #1 Stage/Discharge Data			
Head (ft.)	Q (cfs) Weir Controlled	Q (cfs) Orfice Controlled	Q (cfs) Pipe Flow Controlled
0.0	-	-	-
0.2	2.53	15.22	95.68
0.4	7.15	21.53	96.23
0.6	13.14	26.36	96.77
0.8	20.23	30.44	97.31
1.0	28.27	34.04	97.85
1.2	37.17	37.28	98.38
1.4	46.84	40.27	98.91
1.6	57.22	43.05	98.91
1.8	68.28	45.66	99.44
2.0	79.97	48.13	99.97

Note: 1- 25 year - 6 hour flow = 31.44 cfs.
2- Flow will be weir controlled at a head of 1.07' over riser inlet.

Weir Controlled

$Q = CLH^{1.5}$; where: C= 3.0, L= Circumference of Riser = 9.4248', R=1.5'

Orfice Controlled

$Q = C'a\,(2gH)^{0.5}$; where: C= 0.6, a= Area of Riser = 7.0686 ft^2, R=1.5', g= 32.2 ft/sec^2

Pipe Flow Controlled

$Q = \dfrac{a\,(2gH')^{0.5}}{(1+Ke+Kb+KcL)^{0.5}}$; where

a = Area of Pipe = 7.07 ft^2, R = 1.5'
H' = Head = H + 14.5 (Riser) + 0.35 (Slope) + 0.6*4 (barrel height)
Ke = 1.0
Kb = 0.5
Kc = 0.043
L = 70'

TABLE 13b

Table 13b Sediment Pond #2 Stage/Discharge Data			
Head (ft.)	Q (cfs) Weir Controlled	Q (cfs) Orfice Controlled	Q (cfs) Pipe Flow Controlled
0.0	-	-	-
0.2	0.84	1.69	5.81
0.4	2.38	2.39	5.88
0.6	4.38	2.93	5.95
0.8	6.74	3.38	6.02
1.0	9.42	3.78	6.09
1.2	12.39	4.14	6.16
1.4	15.61	4.47	6.22
1.6	19.07	4.78	6.29
1.8	22.76	5.07	6.36
2.0	26.66	5.35	6.42

Note: 1- 25 year - 6 hour flow = 2.86 cfs.
2- Flow will be orifice controlled at a head of 0.57' over riser inlet.

Weir Controlled

$Q = CLH^{1.5}$; where: C= 3.0, L= Circumference of Riser =3.14', R=0.5'

Orfice Controlled

$Q = C'a\ (2gH)^{0.5}$; where: C= 0.6, a= Area of Riser = 0.79 ft^2, R=0.5', g= 32.2 ft/sec^2

Pipe Flow Controlled

$Q = \dfrac{a\ (2gH')^{0.5}}{(1+Ke+Kb+KcL)^{0.5}}$; where

a = Area of Pipe = 0.79 ft^2, R = 0.5'
H' = Head = H + 6.0 (Riser) + 0.8 (Slope) + 0.6*2 (barrel height)
Ke = 1.0
Kb = 0.5
Kc = 0.043
L = 160'

3.4 Sediment Pond Summary

a) The sedimentation ponds have been designed to contain the disturbed area (and contributing undisturbed area) runoff from a 10 year-24 hour precipitation event, along with 3 years of sediment storage capacity. Runoff to the ponds will be directed by various ditches and culverts as described in the plan.

b) The required volume for Sediment Pond #1 is calculated at 7.53 acre feet, including 3 years of sediment storage. The proposed sediment pond size will have a volume of approximately 8.06 acre feet (at the principal spillway), which is more than adequate. The required volume for Sediment Pond #2 is calculated at 0.43 acre feet, including 3 years of sediment storage. The proposed sediment pond size will have a volume of approximately 0.45 acre feet (at the principal spillway), which is more than adequate.

c) The ponds will meet a theoretical detention time of 24 hours. Both are equipped with a decant, a culvert principal spillway and a culvert emergency spillway. Any discharge from the ponds will be in accordance with the approved UPDES Permit.

d) The pond inlets will be protected from erosion, and the spillways will discharge into the natural drainages in a controlled manner.

e) The ponds are temporary, and will be removed upon final reclamation of the property.

f) The ponds will be constructed according to the regulations and under supervision of a Registered, Professional Engineer.

DESIGN OF DRAINAGE CONTROL STRUCTURES
FOR
RECLAMATION

Reclamation Hydrology:

Tables:

Reclamation Hydrology

4.1 General

Upon completion of operations at the Lila Canyon Minesite, the portals will be sealed and backfilled and all structures will be removed except for the sediment ponds, bypass culvert UC-1, reclamation ditches and temporary sediment controls such as silt fences or straw bales.

Any refuse or mine development waste previously deposited under the approved plan will also be left in place. Concrete will be buried beneath at least 2' of non-toxic, non-acid material. Any potentially toxic or acid-forming material buried on site will be covered with a minimum of 4' of material.

The sediment ponds, and all remaining drainage controls will be removed upon completion of Phase II Bond Release.

4.2 Reclamation Area Drainage Control

During the initial phase of reclamation, all drainage controls will be removed with the exception of the two sediment ponds, bypass culvert UC-1, reclaimed ditches RD-1 and RD-2 and temporary sediment controls such as straw bales or silt fences installed in the undisturbed drainages.

As undisturbed drainage culverts are removed, a minimum of two straw bale or silt fence barriers will be installed downstream of each location for sediment control purposes.

Disturbed areas will be regraded and reclaimed ditches RD-1 and RD-2 will be installed to collect the runoff from the site area and direct it to the outlet structures (see Plate 7-7).

When the vegetation and sediment contribution levels meet requirements for Phase II Bond Release, a series of at least three straw bale or silt fence barriers will be placed downstream of the sediment pond outlets. All upstream sediment controls will be removed. Reclaimed ditches RD-1 and RD-2 will also be removed, regraded and reseeded. Culvert UC-1 will be cut off at the location of the principal pond spillway.

The portion of culvert UC-1 remaining beneath the road will be left as a permanent drainage control. The culvert will be equipped with an inlet section and rip-rapped headwall. The culvert is adequately sized to safely pass runoff from a 100 year - 6 hour event, as shown in Table 10. To ensure that state of the art technology is incorporated, the final reclamation plans for the sedimentation pond areas will be submitted prior to commencement of final reclamation of this area.

The remainder of culvert UC-1 will be removed, and the natural channel restored through the sediment pond #1 area. The sediment pond structures will also be removed, the pond areas regraded as necessary and reseeded. The pond #1 embankment will remain as a permanent feature, since the existing (and proposed future) road through the area passes over the embankment.

Following the successful establishment of vegetation and when effluent standards are met, the sediment ponds will be removed. The same methodologies relative to recontouring, top soil application and seeding will be utilized in grading and revegetating the pond areas as outlined in Chapters 2, 5, and Appendix 5-8.

The pond embankment will be narrowed to facilitate the even character of the Lila Canyon Road. The 48 inch bypass culvert (UC-1) will be removed to within six feet of the road embankment. A newly formed channel will be constructed at an approximate four percent grade to intercept the inlet of the culvert at its intersection of the road. The road embankment and associated new channel will be armored by the Operator with an underlayment of filter gravel, with D_{50}-30 inch rip-rap. The new area of disturbance including the newly formed channel will have top soil spread in and around the rip-rap. The Operator will use the same seeding and mulching methods described in Appendix 5-8 will be used on this area as well. See Figures 4 and 7 for a detailed design.

TABLE 14

Table 14 Final Reclamation Drainage Areas Contributing to Structures	
Channel	Contributing Watershed/Structure
RD-1	RW-1
RD-2	RW-2
UC-1	UA-1, UA-4, RD-1

TABLE 15

Table 15 Final Reclamation Drainage Structure Flow Summary	
Channel	*100/6 Flow (cfs)
RD-1	13.26
RD-2	10.89
UC-1	**72.62

* CN = 83.
** Combined flow for watersheds UA-1, UA-4, and RW-2.

TABLE 16

Table 16 Final Reclamation Reclamation Structure Design Parameters					
Channel	Bottom Width (ft.)	Side Slope H:V	Slope %	Reclaimed Depth (ft.)	Manning's No.
RD-1	3	2:1	5.00	1.5	0.035
RD-2	3	2:1	10.00	1.5	0.035
UC-1	48" Diam.	-	5.56	48" Diam.	0.025

TABLE 17

Table 17 Final Reclamation Reclamation Structure Flow Calculations			
Channel	RD-1	RD-2	UC-1
100 year - 6 hour event (in.)	1.90	1.90	1.90
Peak Flow (cfs)	13.26	10.89	72.62
Velocity (fps)	5.44	6.52	13.34
Required Area (ft.^{2})	2.44	1.67	5.44
Flow Depth (ft.)	0.58	0.43	1.79

Alternate Sediment Control for Fan Site and Topsoil Storage Area

Sediment Control at the fan, slope below water treatment area, and topsoil storage area sites will be accomplished with a combination of one or more of the following: berms, silt fences, and straw bales.

The topsoil collected from the fan and topsoil storage area sites will be located downslope from the sites and will be used in the construction of the berm. The berm will be constructed a minimum of two feet high and have 2:1 side slopes. The berm will control the flow from a 10 year-24 hour precipitation event. Silt fence will be selectively placed to help control run-off. The berm will be stabilized with vegetation to prevent erosion. As much as practical, the vegetation techniques used on the main topsoil pile will be utilized on the fan topsoil berm.

The outside of the berm will be protected with a silt fence or gravel. The gravel, if used, would help augment the revegetation. Construction details of the silt fence/filter fence are shown if Figure 8.

The outslope of the portal access road and the outslope of the water treatment pad will have a silt fence located along the disturbed area boundary to treat the runoff from the slope. While some portions of this area will be disturbed as a result of the fill material placed for the pad and road construction, the major portion of this area is expected to remain undisturbed. As an added protection, the portions of the area that are disturbed by the fill placement will be covered with a erosion control mat to minimize the erosion from this slope and that area seeded to aid in the establishment of a vegetative cover.

Due to lack of final engineering details, the exact location of the berms, silt fences, and subsequent erosion techniques will be determined in field with the approval of UDOGM. The final determination will be made prior to the start of topsoil removal.

Run-off Calculations

Fan Site

Acreage:	0.716 acres
Design Storm:10 year/24 hour:	1.90"
CN:	90
S:	1.111

$$Q = \frac{(P-0.25S)^2}{P+0.8S} = 1.01\text{" of runoff}$$

Total run-off = 0.06 acre feet

Topsoil Storage Area

Acreage:	2.61 acres
Design Storm:10 year/24 hour:	1.90"
CN:	90
S:	1.111

$$Q= \frac{(P-0.25S)^2}{P+0.8S} = 1.01\text{" of runoff}$$

Total run-off = 0.22 acre feet

Water Treatment Area

Acreage:	0.37 acres
Design Storm:10 year/24 hour:	1.90"
CN:	90
S:	1.111

$$Q= \frac{(P-0.2S)^2}{P+0.8S} = 1.01\text{" of runoff}$$

Total run-off = 0.03 acre feet

Lila Canyon Mine
Watershed Calculations

Lila Canyon Mine
Ditch Calculations

Lila Canyon Mine
Culvert Calculations

Project Title = LILA CANYON UA-1 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 75.0

Area = 248.4 acres

Hydraulic length = 5200.00 feet

Elevation change = 1480.0 feet.

Concentration time = 0.27 hours

Unit hydrograph type = Forested

-- Total Area = 248.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 7.02 cfs

Discharge volume = 2.09 acre ft

Project Title = LILA CANYON UA-1 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 75.0

Area = 248.4 acres

Hydraulic length = 5200.00 feet

Elevation change = 1480.0 feet.

Concentration time = 0.27 hours

Unit hydrograph type = Forested

-- Total Area = 248.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 10.31 cfs

Discharge volume = 3.45 acre ft

Project Title = LILA CANYON UA-1 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 75.0

Area = 248.4 acres

Hydraulic length = 5200.00 feet

Elevation change = 1480.0 feet.

Concentration time = 0.27 hours

Unit hydrograph type = Forested

-- Total Area = 248.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 20.48 cfs

Discharge volume = 6.90 acre ft

Project Title = LILA CANYON UA-1 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 75.0

Area = 248.4 acres

Hydraulic length = 1500.00 feet

Elevation change = 1000.0 feet.

Concentration time = 0.27 hours

Unit hydrograph type = Forested

-- Total Area = 248.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour design storm

Peak Discharge = 25.53 cfs

Discharge volume = 6.90 acre ft

Project Title = LILA CANYON UA-2 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 10.0 acres

Hydraulic length = 1500.00 feet

Elevation change = 1000.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 10.0 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.11 cfs

Discharge volume = 0.23 acre ft

Project Title = LILA CANYON UA-2 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 10.0 acres

Hydraulic length = 1500.00 feet

Elevation change = 1000.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 10.0 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 3.11 cfs

Discharge volume = 0.32 acre ft

Project Title = LILA CANYON UA-2 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 10.0 acres

Hydraulic length = 1500.00 feet

Elevation change = 1000.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 10.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 5.35 cfs

Discharge volume = 0.52 acre ft

Project Title = LILA CANYON UA-2 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 10.0 acres

Hydraulic length = 1500.00 feet

Elevation change = 1000.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 10.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 6.11 cfs

Discharge volume = 0.52 acre ft

Project Title = LILA CANYON UA-4 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 14.1 acres

Hydraulic length = 1950.00 feet

Elevation change = 595.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 14.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 3.14 cfs

Discharge volume = 0.32 acre ft

Project Title = LILA CANYON UA-4 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 14.1 acres

Hydraulic length = 1950.00 feet

Elevation change = 595.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 14.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 4.65 cfs

Discharge volume = 0.44 acre ft

Project Title = LILA CANYON UA-4 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 14.1 acres

Hydraulic length = 1950.00 feet

Elevation change = 595.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 14.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 8.04 cfs

Discharge volume = 0.74 acre ft

Project Title = LILA CANYON UA-4 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 14.1 acres

Hydraulic length = 1950.00 feet

Elevation change = 595.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 14.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 9.20 cfs

Discharge volume = 0.74 acre ft

Project Title = LILA CANYON UA-6a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: . Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.5 acres

Hydraulic length = 230.00 feet

Elevation change = 80.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.5 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.47 cfs

Discharge volume = 0.06 acre ft

Project Title = LILA CANYON UA-6a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.5 acres

Hydraulic length = 230.00 feet

Elevation change = 80.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.5 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.60 cfs

Discharge volume = 0.08 acre ft

Project Title = LILA CANYON UA-6a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.5 acres

Hydraulic length = 230.00 feet

Elevation change = 80.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.88 cfs

Discharge volume = 0.12 acre ft

Project Title = LILA CANYON UA-6a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.5 acres

Hydraulic length = 230.00 feet

Elevation change = 80.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.95 cfs

Discharge volume = 0.12 acre ft

Project Title = LILA CANYON UA-6b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 90.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.10 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON UA-6b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 90.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.13 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON UA-6b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 90.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.19 cfs

Discharge volume = 0.03 acre ft

Project Title = LILA CANYON UA-6b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 90.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.21 cfs

Discharge volume = 0.03 acre ft

Project Title = LILA CANYON UA - 7 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:Null

-- Watershed data for watershed # 1

Curve number	=	90.0
Area	=	0.6 acres
Hydraulic length	=	195.0 Feet
Elevation change	=	25.0 feet
Concentration time	=	0.02 hours
Concentration time type	=	SCS Upland Curves
Unit Hydrograph type	=	Disturbed

-- Total Area = 0.6 acres

-- Storm Data

Total precipitation	=	1.3 inches
Storm type	=	SCS 6 hour design storm
Peak Discharge	=	0.21 cfs
Discharge volume	=	0.03 acre ft

Project Title = LILA CANYON UA - 7 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:Null

-- Watershed data for watershed # 1

Curve number	=	90.0
Area	=	0.6 acres
Hydraulic length	=	195.0 Feet
Elevation change	=	25.0 feet
Concentration time	=	0.02 hours
Concentration time type	=	SCS Upland Curves
Unit Hydrograph type	=	Disturbed

-- Total Area = 0.6 acres

-- Storm Data

Total precipitation	=	1.5 inches
Storm type	=	SCS 6 hour design storm
Peak Discharge	=	0.27 cfs
Discharge volume	=	0.03 acre ft

Project Title = LILA CANYON UA - 7 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:Null

-- Watershed data for watershed # 1

Curve number	=	90.0
Area	=	0.6 acres
Hydraulic length	=	195.0 Feet
Elevation change	=	25.0 feet
Concentration time	=	0.02 hours
Concentration time type	=	SCS Upland Curves
Unit Hydrograph type	=	Disturbed

-- Total Area = 0.6 acres

-- Storm Data

Total precipitation	=	1.9 inches
Storm type	=	SCS 6 hour design storm
Peak Discharge	=	0.40 cfs
Discharge volume	=	0.05 acre ft

Project Title = LILA CANYON UA - 7 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:Null

-- Watershed data for watershed # 1

Curve number	=	90.0
Area	=	0.6 acres
Hydraulic length	=	195.0 Feet
Elevation change	=	25.0 feet
Concentration time	=	0.02 hours
Concentration time type	=	SCS Upland Curves
Unit Hydrograph type	=	Disturbed

-- Total Area = 0.6 acres

-- Storm Data

Total precipitation	=	1.9 inches
Storm type	=	SCS Type 2 storm, 24 hour storm
Peak Discharge	=	0.43 cfs
Discharge volume	=	0.03 acre ft

Project Title = LILA CANYON DA-1a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 680.00 feet

Elevation change = 152.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.22 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON DA-1a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 680.00 feet

Elevation change = 152.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.26 cfs

Discharge volume = 0.03 acre ft

Project Title = LILA CANYON DA-1a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 680.00 feet

Elevation change = 152.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.35 cfs

Discharge volume = 0.04 acre ft

Project Title = LILA CANYON DA-1a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 680.00 feet

Elevation change = 152.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.37 cfs

Discharge volume = 0.04 acre ft

Project Title = LILA CANYON DA-1b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 420.00 feet

Elevation change = 48.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.20 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON DA-1b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 420.00 feet

Elevation change = 48.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.24 cfs

Discharge volume = 0.03 acre ft

Project Title = LILA CANYON DA-1b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 420.00 feet

Elevation change = 48.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.32 cfs

Discharge volume = 0.04 acre ft

Project Title = LILA CANYON DA-1b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 420.00 feet

Elevation change = 48.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.33 cfs

Discharge volume = 0.04 acre ft

Project Title = LILA CANYON DA-1c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 225.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.11 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-1c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 225.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.14 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON DA-1c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 225.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.19 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON DA-1c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 225.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.19 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON DA-2a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.9 acres

Hydraulic length = 680.00 feet

Elevation change = 162.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.9 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.61 cfs

Discharge volume = 0.06 acre ft

Project Title = LILA CANYON DA-2a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.9 acres

Hydraulic length = 680.00 feet

Elevation change = 162.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.9 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.73 cfs

Discharge volume = 0.08 acre ft

Project Title = LILA CANYON DA-2a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.9 acres

Hydraulic length = 680.00 feet

Elevation change = 162.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.98 cfs

Discharge volume = 0.11 acre ft

Project Title = LILA CANYON DA-2a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.9 acres

Hydraulic length = 680.00 feet

Elevation change = 162.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 1.03 cfs

Discharge volume = 0.11 acre ft

Project Title = LILA CANYON DA-2b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 350.00 feet

Elevation change = 36.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.09 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-2b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 350.00 feet

Elevation change = 36.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.10 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-2b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 350.00 feet

Elevation change = 36.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.14 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON DA-2b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 350.00 feet

Elevation change = 36.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.15 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON DA-2c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 106.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.04 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-2c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 106.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.05 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-2c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 106.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.07 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-2c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 106.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.08 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-3 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 170.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.11 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-3 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 170.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.14 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON DA-3 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 170.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.20 cfs

Discharge volume = 0.03 acre ft

Project Title = LILA CANYON DA-3 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 170.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.21 cfs

Discharge volume = 0.03 acre ft

Project Title = LILA CANYON DA-4a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.06 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-4a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.08 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-4a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.10 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON DA-4a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.11 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON DA-4b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 270.00 feet

Elevation change = 28.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.07 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-4b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 270.00 feet

Elevation change = 28.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.08 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-4b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 270.00 feet

Elevation change = 28.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.11 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-4b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 270.00 feet

Elevation change = 28.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.12 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-4c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 580.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.42 cfs

Discharge volume = 0.04 acre ft

Project Title = LILA CANYON DA-4c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 580.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.51 cfs

Discharge volume = 0.05 acre ft

Project Title = LILA CANYON DA-4c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 580.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.68 cfs

Discharge volume = 0.07 acre ft

Project Title = LILA CANYON DA-4c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 580.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.71 cfs

Discharge volume = 0.07 acre ft

Project Title = LILA CANYON DA-5a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 180.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.05 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-5a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 180.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.06 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-5a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 180.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.08 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-5a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 180.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.09 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-5b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 125.00 feet

Elevation change = 14.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.11 cfs

Discharge volume = 0.01 acre ft

Project Title = LILA CANYON DA-5b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 125.00 feet

Elevation change = 14.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.14 cfs

Discharge volume = 0.02 acre ft

Project Title = LILA CANYON DA-5b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 125.00 feet

Elevation change = 14.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.20 cfs

Discharge volume = 0.03 acre ft

Project Title = LILA CANYON DA-5b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 125.00 feet

Elevation change = 14.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.21 cfs

Discharge volume = 0.03 acre ft

Project Title = LILA CANYON DA-5c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 570.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.29 cfs

Discharge volume = 0.03 acre ft

Project Title = LILA CANYON DA-5c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 570.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.35 cfs

Discharge volume = 0.04 acre ft

Project Title = LILA CANYON DA-5c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 570.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.47 cfs

Discharge volume = 0.05 acre ft

Project Title = LILA CANYON DA-5c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 570.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.49 cfs

Discharge volume = 0.05 acre ft

Project Title = Lila Canyon DA-6a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 200.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.09 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-6a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 200.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.12 cfs

Discharge volume = 0.02 acre ft

Project Title = Lila Canyon DA-6a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 200.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.17 cfs

Discharge volume = 0.02 acre ft

Project Title = Lila Canyon DA-6a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 200.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.18 cfs

Discharge volume = 0.02 acre ft

Project Title = Lila Canyon DA-6b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 3.3 acres

Hydraulic length = 760.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.60 cfs

Discharge volume = 0.15 acre ft

Project Title = Lila Canyon DA-6b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 3.3 acres

Hydraulic length = 760.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.06 cfs

Discharge volume = 0.19 acre ft

Project Title = Lila Canyon DA-6b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 3.3 acres

Hydraulic length = 760.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 3.03 cfs

Discharge volume = 0.28 acre ft

Project Title = Lila Canyon DA-6b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 3.3 acres

Hydraulic length = 760.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 3.27 cfs

Discharge volume = 0.28 acre ft

Project Title = Lila Canyon DA-6c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 2.5 acres

Hydraulic length = 690.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.5 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.18 cfs

Discharge volume = 0.11 acre ft

Project Title = Lila Canyon DA-6c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 2.5 acres

Hydraulic length = 690.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.5 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.52 cfs

Discharge volume = 0.14 acre ft

Project Title = Lila Canyon DA-6c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 2.5 acres

Hydraulic length = 690.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.23 cfs

Discharge volume = 0.21 acre ft

Project Title = Lila Canyon DA-6c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 2.5 acres

Hydraulic length = 690.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 2.40 cfs

Discharge volume = 0.21 acre ft

Project Title = Lila Canyon DA-7 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.7 acres

Hydraulic length = 630.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.7 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.98 cfs

Discharge volume = 0.19 acre ft

Project Title = Lila Canyon DA-7 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.7 acres

Hydraulic length = 630.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.7 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.39 cfs

Discharge volume = 0.23 acre ft

Project Title = Lila Canyon DA-7 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.7 acres

Hydraulic length = 630.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.7 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 3.22 cfs

Discharge volume = 0.31 acre ft

Project Title = Lila Canyon DA-7 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.7 acres

Hydraulic length = 630.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.7 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 3.36 cfs

Discharge volume = 0.31 acre ft

Project Title = Lila Canyon DA-8a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 284.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.10 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-8a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 284.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.12 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-8a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 284.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.18 cfs

Discharge volume = 0.02 acre ft

Project Title = Lila Canyon DA-8a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 284.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.19 cfs

Discharge volume = 0.02 acre ft

Project Title = Lila Canyon DA-8b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.8 acres

Hydraulic length = 670.00 feet

Elevation change = 52.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.36 cfs

Discharge volume = 0.03 acre ft

Project Title = Lila Canyon DA-8b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.8 acres

Hydraulic length = 670.00 feet

Elevation change = 52.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.47 cfs

Discharge volume = 0.04 acre ft

Project Title = Lila Canyon DA-8b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.8 acres

Hydraulic length = 670.00 feet

Elevation change = 52.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.68 cfs

Discharge volume = 0.06 acre ft

Project Title = Lila Canyon DA-8b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.8 acres

Hydraulic length = 670.00 feet

Elevation change = 52.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.74 cfs

Discharge volume = 0.06 acre ft

Project Title = Lila Canyon DA-8c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.0 acres

Hydraulic length = 410.00 feet

Elevation change = 42.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.0 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.40 cfs

Discharge volume = 0.04 acre ft

Project Title = Lila Canyon DA-8c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.0 acres

Hydraulic length = 410.00 feet

Elevation change = 42.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.0 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.52 cfs

Discharge volume = 0.05 acre ft

Project Title = Lila Canyon DA-8c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.0 acres

Hydraulic length = 410.00 feet

Elevation change = 42.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.76 cfs

Discharge volume = 0.08 acre ft

Project Title = Lila Canyon DA-8c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.0 acres

Hydraulic length = 410.00 feet

Elevation change = 42.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.81 cfs

Discharge volume = 0.08 acre ft

Project Title = Lila Canyon DA-9 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 50.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.04 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-9 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 50.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.05 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-9 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 50.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.06 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-9 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 50.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.07 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-10 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.9 acres

Hydraulic length = 700.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.08 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.9 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.19 cfs

Discharge volume = 0.20 acre ft

Project Title = Lila Canyon DA-10 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.9 acres

Hydraulic length = 700.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.08 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.9 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.65 cfs

Discharge volume = 0.24 acre ft

Project Title = Lila Canyon DA-10 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.9 acres

Hydraulic length = 700.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.08 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 3.57 cfs

Discharge volume = 0.33 acre ft

Project Title = Lila Canyon DA-10 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.9 acres

Hydraulic length = 700.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.08 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 3.73 cfs

Discharge volume = 0.33 acre ft

Project Title = Lila Canyon DA-11 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 340.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.52 cfs

Discharge volume = 0.05 acre ft

Project Title = Lila Canyon DA-11 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 340.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.63 cfs

Discharge volume = 0.07 acre ft

Project Title = Lila Canyon DA-11 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 340.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.85 cfs

Discharge volume = 0.09 acre ft

Project Title = Lila Canyon DA-11 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 340.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.89 cfs

Discharge volume = 0.09 acre ft

Project Title = Lila Canyon DA-13a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.0 acres

Hydraulic length = 470.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.0 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.46 cfs

Discharge volume = 0.14 acre ft

Project Title = Lila Canyon DA-13a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.0 acres

Hydraulic length = 470.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.0 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.76 cfs

Discharge volume = 0.17 acre ft

Project Title = Lila Canyon DA-13a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.0 acres

Hydraulic length = 470.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.37 cfs

Discharge volume = 0.23 acre ft

Project Title = Lila Canyon DA-13a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.0 acres

Hydraulic length = 470.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 2.47 cfs

Discharge volume = 0.23 acre ft

Project Title = Lila Canyon DA-13b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.5 acres

Hydraulic length = 280.00 feet

Elevation change = 4.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.5 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.23 cfs

Discharge volume = 0.02 acre ft

Project Title = Lila Canyon DA-13b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.5 acres

Hydraulic length = 280.00 feet

Elevation change = 4.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.5 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.30 cfs

Discharge volume = 0.03 acre ft

Project Title = Lila Canyon DA-13b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.5 acres

Hydraulic length = 280.00 feet

Elevation change = 4.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.44 cfs

Discharge volume = 0.04 acre ft

Project Title = Lila Canyon DA-13b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.5 acres

Hydraulic length = 280.00 feet

Elevation change = 4.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.47 cfs

Discharge volume = 0.04 acre ft

Project Title = Lila Canyon DA-13c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 460.00 feet

Elevation change = 22.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.19 cfs

Discharge volume = 0.02 acre ft

Project Title = Lila Canyon DA-13c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 460.00 feet

Elevation change = 22.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.24 cfs

Discharge volume = 0.02 acre ft

Project Title = Lila Canyon DA-13c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 460.00 feet

Elevation change = 22.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.35 cfs

Discharge volume = 0.03 acre ft

Project Title = Lila Canyon DA-13c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 460.00 feet

Elevation change = 22.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.38 cfs

Discharge volume = 0.03 acre ft

Project Title = Lila Canyon DA-14a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 390.00 feet

Elevation change = 34.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.23 cfs

Discharge volume = 0.02 acre ft

Project Title = Lila Canyon DA-14a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 390.00 feet

Elevation change = 34.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.28 cfs

Discharge volume = 0.03 acre ft

Project Title = Lila Canyon DA-14a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 390.00 feet

Elevation change = 34.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.38 cfs

Discharge volume = 0.04 acre ft

Project Title = Lila Canyon DA-14a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 390.00 feet

Elevation change = 34.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.39 cfs

Discharge volume = 0.04 acre ft

Project Title = Lila Canyon DA-14b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 540.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.56 cfs

Discharge volume = 0.05 acre ft

Project Title = Lila Canyon DA-14b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 540.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.67 cfs

Discharge volume = 0.06 acre ft

Project Title = Lila Canyon DA-14b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 540.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.91 cfs

Discharge volume = 0.09 acre ft

Project Title = Lila Canyon DA-14b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 540.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.95 cfs

Discharge volume = 0.09 acre ft

Project Title = Lila Canyon DA-15a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 525.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.26 cfs

Discharge volume = 0.03 acre ft

Project Title = Lila Canyon DA-15a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 525.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.31 cfs

Discharge volume = 0.03 acre ft

Project Title = Lila Canyon DA-15a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 525.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.42 cfs

Discharge volume = 0.04 acre ft

Project Title = Lila Canyon DA-15a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 525.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.44 cfs

Discharge volume = 0.04 acre ft

Project Title = Lila Canyon DA-15b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 270.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.40 cfs

Discharge volume = 0.04 acre ft

Project Title = Lila Canyon DA-15b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 270.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.48 cfs

Discharge volume = 0.05 acre ft

Project Title = Lila Canyon DA-15b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 270.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.64 cfs

Discharge volume = 0.07 acre ft

Project Title = Lila Canyon DA-15b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 270.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.67 cfs

Discharge volume = 0.07 acre ft

Project Title = Lila Canyon DA-16a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 370.00 feet

Elevation change = 10.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.11 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-16a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 370.00 feet

Elevation change = 10.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.14 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-16a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 370.00 feet

Elevation change = 10.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.19 cfs

Discharge volume = 0.02 acre ft

Project Title = Lila Canyon DA-16a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 370.00 feet

Elevation change = 10.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.19 cfs

Discharge volume = 0.02 acre ft

Project Title = Lila Canyon DA-16b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 210.00 feet

Elevation change = 13.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.06 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-16b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 210.00 feet

Elevation change = 13.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.07 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-16b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 210.00 feet

Elevation change = 13.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.10 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-16b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 210.00 feet

Elevation change = 13.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.10 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-17a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 610.00 feet

Elevation change = 19.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.31 cfs

Discharge volume = 0.03 acre ft

Project Title = Lila Canyon DA-17a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 610.00 feet

Elevation change = 19.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.38 cfs

Discharge volume = 0.04 acre ft

Project Title = Lila Canyon DA-17a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 610.00 feet

Elevation change = 19.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.51 cfs

Discharge volume = 0.05 acre ft

Project Title = Lila Canyon DA-17a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 610.00 feet

Elevation change = 19.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.53 cfs

Discharge volume = 0.05 acre ft

Project Title = Lila Canyon DA-17b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 5.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.05 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-17b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 5.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.06 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-17b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 5.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.08 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-17b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 5.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.09 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-18a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 175.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.06 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-18a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 175.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.07 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-18a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 175.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.10 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-18a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 175.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.10 cfs

Discharge volume = 0.01 acre ft

Project Title = Lila Canyon DA-18b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 650.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.33 cfs

Discharge volume = 0.03 acre ft

Project Title = Lila Canyon DA-18b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 650.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.40 cfs

Discharge volume = 0.04 acre ft

Project Title = Lila Canyon DA-18b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 650.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.53 cfs

Discharge volume = 0.05 acre ft

Project Title = Lila Canyon DA-18b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 650.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.56 cfs

Discharge volume = 0.05 acre ft

Project Title = Lila Canyon TS-1 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 3.0 acres

Hydraulic length = 660.00 feet

Elevation change = 38.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.0 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.65 cfs

Discharge volume = 0.07 acre ft

Project Title = Lila Canyon TS-1 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 3.0 acres

Hydraulic length = 660.00 feet

Elevation change = 38.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.0 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.96 cfs

Discharge volume = 0.09 acre ft

Project Title = Lila Canyon TS-1 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 3.0 acres

Hydraulic length = 660.00 feet

Elevation change = 38.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.66 cfs

Discharge volume = 0.15 acre ft

Project Title = Lila Canyon TS-1 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 3.0 acres

Hydraulic length = 660.00 feet

Elevation change = 38.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 1.90 cfs

Discharge volume = 0.15 acre ft

Project Title = Lila Canyon Pond 1 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 1.9 acres

Hydraulic length = 380.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.9 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.18 cfs

Discharge volume = 0.13 acre ft

Project Title = Lila Canyon Pond 1 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 1.9 acres

Hydraulic length = 380.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.9 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.42 cfs

Discharge volume = 0.16 acre ft

Project Title = Lila Canyon Pond 1 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 1.9 acres

Hydraulic length = 380.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.91 cfs

Discharge volume = 0.22 acre ft

Project Title = Lila Canyon Pond 1 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 1.9 acres

Hydraulic length = 380.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 1.99 cfs

Discharge volume = 0.22 acre ft

Project Title = Lila Site - RW-1 - 100/6

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 23.5 acres

Hydraulic length = 1970.00 feet

Elevation change = 325.0 feet.

Concentration time = 0.09 hours

Unit hydrograph type = Disturbed

-- Total Area = 23.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 13.26 cfs

Discharge volume = 1.23 acre ft

Project Title = Lila Site - RW-2 - 100/6

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 19.1 acres

Hydraulic length = 2430.00 feet

Elevation change = 655.0 feet.

Concentration time = 0.09 hours

Unit hydrograph type = Disturbed

-- Total Area = 19.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 10.89 cfs

Discharge volume = 1.00 acre ft

Project Title = Lila Site - UC-1 - 100/6

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 281.6 acres

Hydraulic length = 5200.00 feet

Elevation change = 1480.0 feet.

Concentration time = 0.15 hours

Unit hydrograph type = Forested

-- Total Area = 281.6 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 72.62 cfs

Discharge volume = 14.73 acre ft

Lila Canyon Mine
Ditch Calculations

Flow Depth Calculation Worksheet

Project Description

Worksheet	DD-1a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data

Mannings Coefficient	0.035	
Slope	0.114 200	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.22	cfs

Results

Depth	0.20	ft
Flow Area	0.08	ft²
Wetted Perimeter	0.88	ft
Top Width	0.79	ft
Critical Depth	0.24	ft
Critical Slope	0.042153	ft/ft
Velocity	2.84	ft/s
Velocity Head	0.13	ft
Specific Energy	0.32	ft
Froude Number	1.60	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-1a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.114200 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	0.37 cfs

Results	
Depth	0.24 ft
Flow Area	0.11 ft²
Wetted Perimeter	1.07 ft
Top Width	0.96 ft
Critical Depth	0.29 ft
Critical Slope	0.039331 ft/ft
Velocity	3.23 ft/s
Velocity Head	0.16 ft
Specific Energy	0.40 ft
Froude Number	1.65
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-1b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.112 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.52	cfs

Results		
Depth	0.27	ft
Flow Area	0.15	ft²
Wetted Perimeter	1.22	ft
Top Width	1.09	ft
Critical Depth	0.33	ft
Critical Slope	0.037586	ft/ft
Velocity	3.49	ft/s
Velocity Head	0.19	ft
Specific Energy	0.46	ft
Froude Number	1.67	
Flow Type	Supercritical	

Flow Depth Calculation
Worksheet

Project Description	
Worksheet	DD-1b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.112000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.91	cfs

Results		
Depth	0.34	ft
Flow Area	0.23	ft²
Wetted Perimeter	1.50	ft
Top Width	1.35	ft
Critical Depth	0.42	ft
Critical Slope	0.034884	ft/ft
Velocity	4.02	ft/s
Velocity Head	0.25	ft
Specific Energy	0.59	ft
Froude Number	1.73	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-1c
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.100 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.63	cfs

Results		
Depth	0.30	ft
Flow Area	0.18	ft²
Wetted Perimeter	1.34	ft
Top Width	1.20	ft
Critical Depth	0.36	ft
Critical Slope	0.036639	ft/ft
Velocity	3.51	ft/s
Velocity Head	0.19	ft
Specific Energy	0.49	ft
Froude Number	1.60	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-1c
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.100 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	1.10	cfs

Results		
Depth	0.37	ft
Flow Area	0.27	ft²
Wetted Perimeter	1.65	ft
Top Width	1.48	ft
Critical Depth	0.45	ft
Critical Slope	0.034013	ft/ft
Velocity	4.04	ft/s
Velocity Head	0.25	ft
Specific Energy	0.62	ft
Froude Number	1.66	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-2a
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.120 600	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	2.72	cfs

Results		
Depth	0.23	ft
Flow Area	0.56	ft²
Wetted Perimeter	3.03	ft
Top Width	2.92	ft
Critical Depth	0.34	ft
Critical Slope	0.029303	ft/ft
Velocity	4.81	ft/s
Velocity Head	0.36	ft
Specific Energy	0.59	ft
Froude Number	1.93	
Flow Type	Supercritical	

Flow Depth Calculation
Worksheet

Project Description	
Worksheet	DD-2a
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.120600 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	2.00 ft
Discharge	7.14 cfs

Results	
Depth	0.39 ft
Flow Area	1.10 ft²
Wetted Perimeter	3.76 ft
Top Width	3.58 ft
Critical Depth	0.60 ft
Critical Slope	0.025602 ft/ft
Velocity	6.49 ft/s
Velocity Head	0.66 ft
Specific Energy	1.05 ft
Froude Number	2.06
Flow Type	Supercritical

Flow Depth Calculation
Worksheet

Project Description	
Worksheet	DD-2b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.102900	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	2.81	cfs

Results		
Depth	0.24	ft
Flow Area	0.61	ft²
Wetted Perimeter	3.09	ft
Top Width	2.98	ft
Critical Depth	0.35	ft
Critical Slope	0.029163	ft/ft
Velocity	4.61	ft/s
Velocity Head	0.33	ft
Specific Energy	0.58	ft
Froude Number	1.80	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-2b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.102900 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	2.00 ft
Discharge	7.29 cfs

Results	
Depth	0.42 ft
Flow Area	1.18 ft²
Wetted Perimeter	3.86 ft
Top Width	3.67 ft
Critical Depth	0.60 ft
Critical Slope	0.025530 ft/ft
Velocity	6.18 ft/s
Velocity Head	0.59 ft
Specific Energy	1.01 ft
Froude Number	1.92
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-2c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.142900	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	2.85	cfs

Results		
Depth	0.22	ft
Flow Area	0.55	ft^2
Wetted Perimeter	3.01	ft
Top Width	2.90	ft
Critical Depth	0.35	ft
Critical Slope	0.029103	ft/ft
Velocity	5.18	ft/s
Velocity Head	0.42	ft
Specific Energy	0.64	ft
Froude Number	2.09	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-2c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.142900	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	7.37	cfs

Results		
Depth	0.38	ft
Flow Area	1.06	ft²
Wetted Perimeter	3.71	ft
Top Width	3.53	ft
Critical Depth	0.61	ft
Critical Slope	0.025493	ft/ft
Velocity	6.96	ft/s
Velocity Head	0.75	ft
Specific Energy	1.14	ft
Froude Number	2.24	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-3
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.006 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.11	cfs

Results		
Depth	0.26	ft
Flow Area	0.14	ft²
Wetted Perimeter	1.18	ft
Top Width	1.05	ft
Critical Depth	0.18	ft
Critical Slope	0.046236	ft/ft
Velocity	0.79	ft/s
Velocity Head	0.01	ft
Specific Energy	0.27	ft
Froude Number	0.38	
Flow Type	Subcritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-3
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.006 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.21	cfs

Results		
Depth	0.34	ft
Flow Area	0.23	ft²
Wetted Perimeter	1.50	ft
Top Width	1.34	ft
Critical Depth	0.23	ft
Critical Slope	0.042415	ft/ft
Velocity	0.93	ft/s
Velocity Head	0.01	ft
Specific Energy	0.35	ft
Froude Number	0.40	
Flow Type	Subcritical	

Flow Depth Calculation
Worksheet

Project Description	
Worksheet	DD-4a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.110 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.06	cfs

Results		
Depth	0.12	ft
Flow Area	0.03	ft²
Wetted Perimeter	0.54	ft
Top Width	0.49	ft
Critical Depth	0.14	ft
Critical Slope	0.050132	ft/ft
Velocity	2.02	ft/s
Velocity Head	0.06	ft
Specific Energy	0.19	ft
Froude Number	1.45	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-4a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.110 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.11	cfs

Results		
Depth	0.15	ft
Flow Area	0.05	ft^2
Wetted Perimeter	0.68	ft
Top Width	0.61	ft
Critical Depth	0.18	ft
Critical Slope	0.046233	ft/ft
Velocity	2.35	ft/s
Velocity Head	0.09	ft
Specific Energy	0.24	ft
Froude Number	1.50	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-4b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.102600	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.24	cfs

Results		
Depth	0.21	ft
Flow Area	0.09	ft^2
Wetted Perimeter	0.93	ft
Top Width	0.83	ft
Critical Depth	0.25	ft
Critical Slope	0.041670	ft/ft
Velocity	2.79	ft/s
Velocity Head	0.12	ft
Specific Energy	0.33	ft
Froude Number	1.53	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-4b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.102600	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.44	cfs

Results		
Depth	0.26	ft
Flow Area	0.14	ft²
Wetted Perimeter	1.16	ft
Top Width	1.04	ft
Critical Depth	0.31	ft
Critical Slope	0.038435	ft/ft
Velocity	3.24	ft/s
Velocity Head	0.16	ft
Specific Energy	0.42	ft
Froude Number	1.58	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-4c
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.100 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.66	cfs

Results		
Depth	0.30	ft
Flow Area	0.19	ft²
Wetted Perimeter	1.36	ft
Top Width	1.22	ft
Critical Depth	0.37	ft
Critical Slope	0.036412	ft/ft
Velocity	3.55	ft/s
Velocity Head	0.20	ft
Specific Energy	0.50	ft
Froude Number	1.61	
Flow Type	Supercritical	

Flow Depth Calculation
Worksheet

Project Description	
Worksheet	DD-4c
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.100 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	1.15	cfs

Results		
Depth	0.38	ft
Flow Area	0.28	ft²
Wetted Perimeter	1.68	ft
Top Width	1.50	ft
Critical Depth	0.46	ft
Critical Slope	0.033812	ft/ft
Velocity	4.08	ft/s
Velocity Head	0.26	ft
Specific Energy	0.63	ft
Froude Number	1.66	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-5a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.131100	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.05	cfs

Results		
Depth	0.11	ft
Flow Area	0.02	ft^2
Wetted Perimeter	0.49	ft
Top Width	0.44	ft
Critical Depth	0.13	ft
Critical Slope	0.051359	ft/ft
Velocity	2.06	ft/s
Velocity Head	0.07	ft
Specific Energy	0.18	ft
Froude Number	1.55	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-5a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.131100 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	0.09 cfs

Results	
Depth	0.14 ft
Flow Area	0.04 ft²
Wetted Perimeter	0.61 ft
Top Width	0.55 ft
Critical Depth	0.17 ft
Critical Slope	0.047489 ft/ft
Velocity	2.39 ft/s
Velocity Head	0.09 ft
Specific Energy	0.23 ft
Froude Number	1.61
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-5b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.111100	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.16	cfs

Results		
Depth	0.18	ft
Flow Area	0.06	ft²
Wetted Perimeter	0.79	ft
Top Width	0.70	ft
Critical Depth	0.21	ft
Critical Slope	0.043980	ft/ft
Velocity	2.59	ft/s
Velocity Head	0.10	ft
Specific Energy	0.28	ft
Froude Number	1.54	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-5b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.111 100	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.30	cfs

Results		
Depth	0.22	ft
Flow Area	0.10	ft²
Wetted Perimeter	0.99	ft
Top Width	0.89	ft
Critical Depth	0.27	ft
Critical Slope	0.040446	ft/ft
Velocity	3.04	ft/s
Velocity Head	0.14	ft
Specific Energy	0.37	ft
Froude Number	1.61	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-5c
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.095 200	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.45	cfs

Results		
Depth	0.27	ft
Flow Area	0.14	ft²
Wetted Perimeter	1.19	ft
Top Width	1.07	ft
Critical Depth	0.32	ft
Critical Slope	0.038319	ft/ft
Velocity	3.17	ft/s
Velocity Head	0.16	ft
Specific Energy	0.42	ft
Froude Number	1.53	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-5c
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.095 ft/ft 200
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	0.79 cfs

Results	
Depth	0.33 ft
Flow Area	0.22 ft²
Wetted Perimeter	1.47 ft
Top Width	1.32 ft
Critical Depth	0.40 ft
Critical Slope	0.035549 ft/ft
Velocity	3.65 ft/s
Velocity Head	0.21 ft
Specific Energy	0.54 ft
Froude Number	1.59
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-6a
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.040	
Slope	0.180 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	3.00	ft
Discharge	2.94	cfs

Results		
Depth	0.19	ft
Flow Area	0.62	ft²
Wetted Perimeter	3.83	ft
Top Width	3.74	ft
Critical Depth	0.29	ft
Critical Slope	0.038670	ft/ft
Velocity	4.71	ft/s
Velocity Head	0.34	ft
Specific Energy	0.53	ft
Froude Number	2.03	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-6a
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.040	
Slope	0.180 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	3.00	ft
Discharge	7.55	cfs

Results		
Depth	0.32	ft
Flow Area	1.17	ft²
Wetted Perimeter	4.43	ft
Top Width	4.28	ft
Critical Depth	0.52	ft
Critical Slope	0.033399	ft/ft
Velocity	6.47	ft/s
Velocity Head	0.65	ft
Specific Energy	0.97	ft
Froude Number	2.19	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-6b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.025600	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	4.54	cfs

Results		
Depth	0.60	ft
Flow Area	1.32	ft²
Wetted Perimeter	3.69	ft
Top Width	3.40	ft
Critical Depth	0.59	ft
Critical Slope	0.027318	ft/ft
Velocity	3.43	ft/s
Velocity Head	0.18	ft
Specific Energy	0.78	ft
Froude Number	0.97	
Flow Type	Subcritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-6b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.025600	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	10.82	cfs

Results		
Depth	0.90	ft
Flow Area	2.52	ft²
Wetted Perimeter	5.03	ft
Top Width	4.60	ft
Critical Depth	0.91	ft
Critical Slope	0.024474	ft/ft
Velocity	4.29	ft/s
Velocity Head	0.29	ft
Specific Energy	1.19	ft
Froude Number	1.02	
Flow Type	Supercritical	

Flow Depth Calculation
Worksheet

Project Description	
Worksheet	DD-6c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.033800 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	1.00 ft
Discharge	1.18 cfs

Results	
Depth	0.28 ft
Flow Area	0.45 ft²
Wetted Perimeter	2.27 ft
Top Width	2.14 ft
Critical Depth	0.29 ft
Critical Slope	0.032550 ft/ft
Velocity	2.64 ft/s
Velocity Head	0.11 ft
Specific Energy	0.39 ft
Froude Number	1.02
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-6c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.033800 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	1.00 ft
Discharge	2.40 cfs

Results	
Depth	0.41 ft
Flow Area	0.75 ft²
Wetted Perimeter	2.84 ft
Top Width	2.64 ft
Critical Depth	0.42 ft
Critical Slope	0.029643 ft/ft
Velocity	3.21 ft/s
Velocity Head	0.16 ft
Specific Energy	0.57 ft
Froude Number	1.06
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-7
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.010 ft/ft 800
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	1.00 ft
Discharge	2.45 cfs

Results		
Depth	0.55	ft
Flow Area	1.15	ft²
Wetted Perimeter	3.46	ft
Top Width	3.20	ft
Critical Depth	0.43	ft
Critical Slope	0.029564	ft/ft
Velocity	2.12	ft/s
Velocity Head	0.07	ft
Specific Energy	0.62	ft
Froude Number	0.62	
Flow Type	Subcritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-7
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.010800	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	4.31	cfs

Results		
Depth	0.72	ft
Flow Area	1.75	ft^2
Wetted Perimeter	4.22	ft
Top Width	3.88	ft
Critical Depth	0.58	ft
Critical Slope	0.027500	ft/ft
Velocity	2.46	ft/s
Velocity Head	0.09	ft
Specific Energy	0.81	ft
Froude Number	0.64	
Flow Type	Subcritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-8a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.204200 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	0.10 cfs

Results	
Depth	0.13 ft
Flow Area	0.03 ft²
Wetted Perimeter	0.59 ft
Top Width	0.53 ft
Critical Depth	0.17 ft
Critical Slope	0.046828 ft/ft
Velocity	2.90 ft/s
Velocity Head	0.13 ft
Specific Energy	0.26 ft
Froude Number	1.99
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-8a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.204200	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.19	cfs

Results		
Depth	0.17	ft
Flow Area	0.06	ft²
Wetted Perimeter	0.75	ft
Top Width	0.67	ft
Critical Depth	0.22	ft
Critical Slope	0.042986	ft/ft
Velocity	3.40	ft/s
Velocity Head	0.18	ft
Specific Energy	0.35	ft
Froude Number	2.08	
Flow Type	Supercritical	

Flow Depth Calculation
Worksheet

Project Description	
Worksheet	DD-8b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.078100	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	2.91	cfs

Results		
Depth	0.37	ft
Flow Area	0.63	ft²
Wetted Perimeter	2.64	ft
Top Width	2.46	ft
Critical Depth	0.47	ft
Critical Slope	0.028916	ft/ft
Velocity	4.59	ft/s
Velocity Head	0.33	ft
Specific Energy	0.69	ft
Froude Number	1.59	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-8b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.078100	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	5.24	cfs

Results		
Depth	0.49	ft
Flow Area	0.98	ft²
Wetted Perimeter	3.20	ft
Top Width	2.97	ft
Critical Depth	0.64	ft
Critical Slope	0.026826	ft/ft
Velocity	5.37	ft/s
Velocity Head	0.45	ft
Specific Energy	0.94	ft
Froude Number	1.65	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-8c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.040
Slope	0.103 ft/ft 400
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	2.00 ft
Discharge	6.12 cfs

Results		
Depth	0.41	ft
Flow Area	1.14	ft^2
Wetted Perimeter	3.82	ft
Top Width	3.63	ft
Critical Depth	0.55	ft
Critical Slope	0.034142	ft/ft
Velocity	5.35	ft/s
Velocity Head	0.44	ft
Specific Energy	0.85	ft
Froude Number	1.68	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-8c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.040	
Slope	0.103 400	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	14.03	cfs

Results		
Depth	0.63	ft
Flow Area	2.07	ft^2
Wetted Perimeter	4.83	ft
Top Width	4.53	ft
Critical Depth	0.86	ft
Critical Slope	0.030599	ft/ft
Velocity	6.78	ft/s
Velocity Head	0.72	ft
Specific Energy	1.35	ft
Froude Number	1.77	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-9
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.100 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.04	cfs

Results		
Depth	0.11	ft
Flow Area	0.02	ft²
Wetted Perimeter	0.48	ft
Top Width	0.43	ft
Critical Depth	0.12	ft
Critical Slope	0.052913	ft/ft
Velocity	1.76	ft/s
Velocity Head	0.05	ft
Specific Energy	0.15	ft
Froude Number	1.35	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-9
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.100 ft/ft 000
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	0.07 cfs

Results	
Depth	0.13 ft
Flow Area	0.03 ft²
Wetted Perimeter	0.59 ft
Top Width	0.53 ft
Critical Depth	0.15 ft
Critical Slope	0.049110 ft/ft
Velocity	2.03 ft/s
Velocity Head	0.06 ft
Specific Energy	0.20 ft
Froude Number	1.40
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-10
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.030 200	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	2.19	cfs

Results		
Depth	0.40	ft
Flow Area	0.73	ft^2
Wetted Perimeter	2.80	ft
Top Width	2.61	ft
Critical Depth	0.40	ft
Critical Slope	0.029996	ft/ft
Velocity	3.00	ft/s
Velocity Head	0.14	ft
Specific Energy	0.54	ft
Froude Number	1.00	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-10
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.030 200	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	3.73	cfs

Results		
Depth	0.53	ft
Flow Area	1.08	ft²
Wetted Perimeter	3.35	ft
Top Width	3.10	ft
Critical Depth	0.53	ft
Critical Slope	0.028011	ft/ft
Velocity	3.46	ft/s
Velocity Head	0.19	ft
Specific Energy	0.71	ft
Froude Number	1.04	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-11
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.050 ft/ft 600
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	0.52 cfs

Results	
Depth	0.32 ft
Flow Area	0.20 ft²
Wetted Perimeter	1.42 ft
Top Width	1.27 ft
Critical Depth	0.33 ft
Critical Slope	0.037587 ft/ft
Velocity	2.59 ft/s
Velocity Head	0.10 ft
Specific Energy	0.42 ft
Froude Number	1.15
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-11
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.050 ft/ft 600
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	0.89 cfs

Results	
Depth	0.39 ft
Flow Area	0.30 ft²
Wetted Perimeter	1.73 ft
Top Width	1.55 ft
Critical Depth	0.42 ft
Critical Slope	0.034988 ft/ft
Velocity	2.97 ft/s
Velocity Head	0.14 ft
Specific Energy	0.52 ft
Froude Number	1.19
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-13a
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.025 ft/ft 300
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	1.00 ft
Discharge	3.06 cfs

Results	
Depth	0.50 ft
Flow Area	0.99 ft²
Wetted Perimeter	3.23 ft
Top Width	2.99 ft
Critical Depth	0.48 ft
Critical Slope	0.028730 ft/ft
Velocity	3.08 ft/s
Velocity Head	0.15 ft
Specific Energy	0.65 ft
Froude Number	0.94
Flow Type	Subcritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-13a
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.025 ft/ft 300
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	1.00 ft
Discharge	5.27 cfs

Results	
Depth	0.65 ft
Flow Area	1.48 ft²
Wetted Perimeter	3.89 ft
Top Width	3.59 ft
Critical Depth	0.64 ft
Critical Slope	0.026806 ft/ft
Velocity	3.55 ft/s
Velocity Head	0.20 ft
Specific Energy	0.84 ft
Froude Number	0.97
Flow Type	Subcritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-13b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.032300	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	3.58	cfs

Results		
Depth	0.51	ft
Flow Area	1.02	ft²
Wetted Perimeter	3.26	ft
Top Width	3.03	ft
Critical Depth	0.52	ft
Critical Slope	0.028158	ft/ft
Velocity	3.51	ft/s
Velocity Head	0.19	ft
Specific Energy	0.70	ft
Froude Number	1.07	
Flow Type	Supercritical	

Flow Depth Calculation
Worksheet

Project Description	
Worksheet	DD-13b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.032 300	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	1.00	ft
Discharge	6.16	cfs

Results		
Depth	0.66	ft
Flow Area	1.52	ft²
Wetted Perimeter	3.94	ft
Top Width	3.63	ft
Critical Depth	0.69	ft
Critical Slope	0.026281	ft/ft
Velocity	4.05	ft/s
Velocity Head	0.25	ft
Specific Energy	0.91	ft
Froude Number	1.10	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-13c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.033 ft/ft 000
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	1.00 ft
Discharge	5.77 cfs

Results		
Depth	0.63	ft
Flow Area	1.44	ft²
Wetted Perimeter	3.84	ft
Top Width	3.54	ft
Critical Depth	0.67	ft
Critical Slope	0.026500	ft/ft
Velocity	4.01	ft/s
Velocity Head	0.25	ft
Specific Energy	0.88	ft
Froude Number	1.11	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-13c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.033000 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	1.00 ft
Discharge	9.89 cfs

Results	
Depth	0.82 ft
Flow Area	2.15 ft²
Wetted Perimeter	4.65 ft
Top Width	4.26 ft
Critical Depth	0.87 ft
Critical Slope	0.024753 ft/ft
Velocity	4.61 ft/s
Velocity Head	0.33 ft
Specific Energy	1.15 ft
Froude Number	1.14
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-13d
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.012500 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	3.00 ft
Discharge	6.35 cfs

Results	
Depth	0.57 ft
Flow Area	2.36 ft²
Wetted Perimeter	5.55 ft
Top Width	5.28 ft
Critical Depth	0.46 ft
Critical Slope	0.026236 ft/ft
Velocity	2.69 ft/s
Velocity Head	0.11 ft
Specific Energy	0.68 ft
Froude Number	0.71
Flow Type	Subcritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-13d
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.012 ft/ft 500
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Bottom Width	3.00 ft
Discharge	14.50 cfs

Results	
Depth	0.89 ft
Flow Area	4.25 ft²
Wetted Perimeter	6.98 ft
Top Width	6.56 ft
Critical Depth	0.75 ft
Critical Slope	0.023311 ft/ft
Velocity	3.41 ft/s
Velocity Head	0.18 ft
Specific Energy	1.07 ft
Froude Number	0.75
Flow Type	Subcritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-13e
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.047800	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	3.00	ft
Discharge	6.54	cfs

Results		
Depth	0.40	ft
Flow Area	1.52	ft²
Wetted Perimeter	4.79	ft
Top Width	4.60	ft
Critical Depth	0.47	ft
Critical Slope	0.026120	ft/ft
Velocity	4.31	ft/s
Velocity Head	0.29	ft
Specific Energy	0.69	ft
Froude Number	1.32	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-13e
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.047800	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	3.00	ft
Discharge	14.88	cfs

Results		
Depth	0.63	ft
Flow Area	2.68	ft²
Wetted Perimeter	5.82	ft
Top Width	5.52	ft
Critical Depth	0.77	ft
Critical Slope	0.023228	ft/ft
Velocity	5.54	ft/s
Velocity Head	0.48	ft
Specific Energy	1.11	ft
Froude Number	1.40	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-14a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.087200 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	0.23 cfs

Results	
Depth	0.21 ft
Flow Area	0.09 ft²
Wetted Perimeter	0.94 ft
Top Width	0.84 ft
Critical Depth	0.24 ft
Critical Slope	0.041908 ft/ft
Velocity	2.59 ft/s
Velocity Head	0.10 ft
Specific Energy	0.32 ft
Froude Number	1.41
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-14a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.087 200	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.39	cfs

Results		
Depth	0.26	ft
Flow Area	0.13	ft²
Wetted Perimeter	1.15	ft
Top Width	1.03	ft
Critical Depth	0.30	ft
Critical Slope	0.039057	ft/ft
Velocity	2.96	ft/s
Velocity Head	0.14	ft
Specific Energy	0.39	ft
Froude Number	1.46	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-14b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.031500	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.56	cfs

Results		
Depth	0.36	ft
Flow Area	0.25	ft^2
Wetted Perimeter	1.59	ft
Top Width	1.42	ft
Critical Depth	0.34	ft
Critical Slope	0.037217	ft/ft
Velocity	2.21	ft/s
Velocity Head	0.08	ft
Specific Energy	0.43	ft
Froude Number	0.92	
Flow Type	Subcritical	

Flow Depth Calculation
Worksheet

Project Description	
Worksheet	DD-14b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.031500	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.95	cfs

Results		
Depth	0.43	ft
Flow Area	0.38	ft²
Wetted Perimeter	1.94	ft
Top Width	1.73	ft
Critical Depth	0.43	ft
Critical Slope	0.034685	ft/ft
Velocity	2.52	ft/s
Velocity Head	0.10	ft
Specific Energy	0.53	ft
Froude Number	0.96	
Flow Type	Subcritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-15a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.097 000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.26	cfs

Results		
Depth	0.22	ft
Flow Area	0.09	ft^2
Wetted Perimeter	0.97	ft
Top Width	0.86	ft
Critical Depth	0.25	ft
Critical Slope	0.041227	ft/ft
Velocity	2.78	ft/s
Velocity Head	0.12	ft
Specific Energy	0.34	ft
Froude Number	1.49	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-15a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.097000 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	0.44 cfs

Results	
Depth	0.26 ft
Flow Area	0.14 ft²
Wetted Perimeter	1.18 ft
Top Width	1.05 ft
Critical Depth	0.31 ft
Critical Slope	0.038434 ft/ft
Velocity	3.18 ft/s
Velocity Head	0.16 ft
Specific Energy	0.42 ft
Froude Number	1.54
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-15b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.040700	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.66	cfs

Results		
Depth	0.36	ft
Flow Area	0.26	ft²
Wetted Perimeter	1.61	ft
Top Width	1.44	ft
Critical Depth	0.37	ft
Critical Slope	0.036411	ft/ft
Velocity	2.54	ft/s
Velocity Head	0.10	ft
Specific Energy	0.46	ft
Froude Number	1.05	
Flow Type	Supercritical	

Flow Depth Calculation
Worksheet

Project Description	
Worksheet	DD-15b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.040700 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	1.11 cfs

Results	
Depth	0.44 ft
Flow Area	0.38 ft^2
Wetted Perimeter	1.96 ft
Top Width	1.75 ft
Critical Depth	0.45 ft
Critical Slope	0.033973 ft/ft
Velocity	2.89 ft/s
Velocity Head	0.13 ft
Specific Energy	0.57 ft
Froude Number	1.09
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-16a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.029700	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.11	cfs

Results		
Depth	0.20	ft
Flow Area	0.08	ft²
Wetted Perimeter	0.87	ft
Top Width	0.78	ft
Critical Depth	0.18	ft
Critical Slope	0.046236	ft/ft
Velocity	1.44	ft/s
Velocity Head	0.03	ft
Specific Energy	0.23	ft
Froude Number	0.81	
Flow Type	Subcritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-16a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.029700	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.19	cfs

Results		
Depth	0.24	ft
Flow Area	0.12	ft²
Wetted Perimeter	1.07	ft
Top Width	0.96	ft
Critical Depth	0.22	ft
Critical Slope	0.042985	ft/ft
Velocity	1.65	ft/s
Velocity Head	0.04	ft
Specific Energy	0.28	ft
Froude Number	0.84	
Flow Type	Subcritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-16b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.060 ft/ft 600
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	0.17 cfs

Results	
Depth	0.20 ft
Flow Area	0.08 ft²
Wetted Perimeter	0.90 ft
Top Width	0.80 ft
Critical Depth	0.21 ft
Critical Slope	0.043629 ft/ft
Velocity	2.10 ft/s
Velocity Head	0.07 ft
Specific Energy	0.27 ft
Froude Number	1.17
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-16b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.060600	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.29	cfs

Results		
Depth	0.25	ft
Flow Area	0.12	ft^2
Wetted Perimeter	1.10	ft
Top Width	0.98	ft
Critical Depth	0.27	ft
Critical Slope	0.040630	ft/ft
Velocity	2.40	ft/s
Velocity Head	0.09	ft
Specific Energy	0.34	ft
Froude Number	1.21	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-17a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.026800	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.31	cfs

Results		
Depth	0.29	ft
Flow Area	0.17	ft^2
Wetted Perimeter	1.31	ft
Top Width	1.18	ft
Critical Depth	0.27	ft
Critical Slope	0.040270	ft/ft
Velocity	1.80	ft/s
Velocity Head	0.05	ft
Specific Energy	0.34	ft
Froude Number	0.83	
Flow Type	Subcritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-17a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.026800	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.53	cfs

Results		
Depth	0.36	ft
Flow Area	0.26	ft^2
Wetted Perimeter	1.61	ft
Top Width	1.44	ft
Critical Depth	0.34	ft
Critical Slope	0.037490	ft/ft
Velocity	2.05	ft/s
Velocity Head	0.07	ft
Specific Energy	0.42	ft
Froude Number	0.85	
Flow Type	Subcritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-17b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.041200	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	1.15	cfs

Results		
Depth	0.44	ft
Flow Area	0.39	ft^2
Wetted Perimeter	1.98	ft
Top Width	1.77	ft
Critical Depth	0.46	ft
Critical Slope	0.033813	ft/ft
Velocity	2.93	ft/s
Velocity Head	0.13	ft
Specific Energy	0.58	ft
Froude Number	1.10	
Flow Type	Supercritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-17b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.041 200 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	1.96 cfs

Results	
Depth	0.54 ft
Flow Area	0.59 ft²
Wetted Perimeter	2.42 ft
Top Width	2.16 ft
Critical Depth	0.57 ft
Critical Slope	0.031492 ft/ft
Velocity	3.35 ft/s
Velocity Head	0.17 ft
Specific Energy	0.72 ft
Froude Number	1.13
Flow Type	Supercritical

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-18a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.028600	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.06	cfs

Results		
Depth	0.16	ft
Flow Area	0.05	ft²
Wetted Perimeter	0.70	ft
Top Width	0.63	ft
Critical Depth	0.14	ft
Critical Slope	0.050132	ft/ft
Velocity	1.22	ft/s
Velocity Head	0.02	ft
Specific Energy	0.18	ft
Froude Number	0.77	
Flow Type	Subcritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-18a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.028600	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.10	cfs

Results		
Depth	0.19	ft
Flow Area	0.07	ft^2
Wetted Perimeter	0.85	ft
Top Width	0.76	ft
Critical Depth	0.17	ft
Critical Slope	0.046828	ft/ft
Velocity	1.39	ft/s
Velocity Head	0.03	ft
Specific Energy	0.22	ft
Froude Number	0.79	
Flow Type	Subcritical	

Flow Depth Calculation Worksheet

Project Description	
Worksheet	DD-18b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.035400	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Discharge	0.39	cfs

Results		
Depth	0.30	ft
Flow Area	0.18	ft^2
Wetted Perimeter	1.36	ft
Top Width	1.22	ft
Critical Depth	0.30	ft
Critical Slope	0.039056	ft/ft
Velocity	2.11	ft/s
Velocity Head	0.07	ft
Specific Energy	0.37	ft
Froude Number	0.95	
Flow Type	Subcritical	

Flow Depth Calculation
Worksheet

Project Description	
Worksheet	DD-18b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035
Slope	0.035400 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H : V
Discharge	0.66 cfs

Results	
Depth	0.37 ft
Flow Area	0.27 ft²
Wetted Perimeter	1.66 ft
Top Width	1.48 ft
Critical Depth	0.37 ft
Critical Slope	0.036411 ft/ft
Velocity	2.41 ft/s
Velocity Head	0.09 ft
Specific Energy	0.46 ft
Froude Number	0.99
Flow Type	Subcritical

Channel Depth
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	RD-1
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.050000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	3.00	ft
Discharge	13.26	cfs

Results		
Depth	0.58	ft
Flow Area	2.44	ft²
Wetted Perimeter	5.61	ft
Top Width	5.34	ft
Critical Depth	0.72	ft
Critical Slope	0.023600	ft/ft
Velocity	5.44	ft/s
Velocity Head	0.46	ft
Specific Energy	1.04	ft
Froude Number	1.42	
Flow Type	Supercritical	

Channel Depth
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	RD-2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Slope	0.100000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	3.00	ft
Discharge	10.89	cfs

Results		
Depth	0.43	ft
Flow Area	1.67	ft²
Wetted Perimeter	4.93	ft
Top Width	4.73	ft
Critical Depth	0.64	ft
Critical Slope	0.024259	ft/ft
Velocity	6.52	ft/s
Velocity Head	0.66	ft
Specific Energy	1.09	ft
Froude Number	1.93	
Flow Type	Supercritical	

Lila Canyon Mine
Culvert Calculations

Flow Velocity Calculation Worksheet

Project Description		
Worksheet	DC-1	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	

Input Data		
Mannings Coefficient	0.024	
Slope	0.133300	ft/ft
Diameter	18	in
Discharge	7.29	cfs

Results		
Depth	0.61	ft
Flow Area	0.68	ft²
Wetted Perimeter	2.08	ft
Top Width	1.47	ft
Critical Depth	1.05	ft
Percent Full	40.9	%
Critical Slope	0.023666	ft/ft
Velocity	10.72	ft/s
Velocity Head	1.79	ft
Specific Energy	2.40	ft
Froude Number	2.78	
Maximum Discharge	22.35	cfs
Discharge Full	20.77	cfs
Slope Full	0.016417	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-2
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.107700	ft/ft
Diameter	18	in
Discharge	0.91	cfs

Results		
Depth	0.23	ft
Flow Area	0.17	ft²
Wetted Perimeter	1.21	ft
Top Width	1.08	ft
Critical Depth	0.36	ft
Percent Full	15.3	%
Critical Slope	0.018323	ft/ft
Velocity	5.31	ft/s
Velocity Head	0.44	ft
Specific Energy	0.67	ft
Froude Number	2.35	
Maximum Discharge	19.28	cfs
Discharge Full	17.92	cfs
Slope Full	0.000278	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-3
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.030	ft/ft
	300	
Diameter	18	in
Discharge	7.37	cfs

Results		
Depth	0.99	ft
Flow Area	1.24	ft²
Wetted Perimeter	2.85	ft
Top Width	1.42	ft
Critical Depth	1.05	ft
Percent Full	66.1	%
Critical Slope	0.025868	ft/ft
Velocity	5.94	ft/s
Velocity Head	0.55	ft
Specific Energy	1.54	ft
Froude Number	1.12	
Maximum Discharge	10.23	cfs
Discharge Full	9.51	cfs
Slope Full	0.018207	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-4
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.215 000	ft/ft
Diameter	18	in
Discharge	0.21	cfs

Results		
Depth	0.10	ft
Flow Area	0.05	ft²
Wetted Perimeter	0.77	ft
Top Width	0.74	ft
Critical Depth	0.17	ft
Percent Full	6.5	%
Critical Slope	0.020771	ft/ft
Velocity	4.35	ft/s
Velocity Head	0.29	ft
Specific Energy	0.39	ft
Froude Number	3.00	
Maximum Discharge	27.24	cfs
Discharge Full	25.33	cfs
Slope Full	0.000015	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation
Worksheet

Project Description	
Worksheet	DC-5
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.025
Slope	0.120 000 ft/ft
Diameter	18 in
Discharge	0.30 cfs

Results	
Depth	0.13 ft
Flow Area	0.08 ft²
Wetted Perimeter	0.90 ft
Top Width	0.85 ft
Critical Depth	0.20 ft
Percent Full	8.8 %
Critical Slope	0.019986 ft/ft
Velocity	3.95 ft/s
Velocity Head	0.24 ft
Specific Energy	0.37 ft
Froude Number	2.33
Maximum Discharge	20.35 cfs
Discharge Full	18.92 cfs
Slope Full	0.000030 ft/ft
Flow Type	Supercritical

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-6
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.050 000	ft/ft
Diameter	18	in
Discharge	7.55	cfs

Results		
Depth	0.85	ft
Flow Area	1.04	ft²
Wetted Perimeter	2.56	ft
Top Width	1.49	ft
Critical Depth	1.06	ft
Percent Full	56.9	%
Critical Slope	0.026305	ft/ft
Velocity	7.27	ft/s
Velocity Head	0.82	ft
Specific Energy	1.68	ft
Froude Number	1.53	
Maximum Discharge	13.14	cfs
Discharge Full	12.21	cfs
Slope Full	0.019107	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-7
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.464000	ft/ft
Diameter	18	in
Discharge	4.31	cfs

Results		
Depth	0.34	ft
Flow Area	0.31	ft²
Wetted Perimeter	1.50	ft
Top Width	1.26	ft
Critical Depth	0.80	ft
Percent Full	23.0	%
Critical Slope	0.020400	ft/ft
Velocity	14.05	ft/s
Velocity Head	3.07	ft
Specific Energy	3.41	ft
Froude Number	5.03	
Maximum Discharge	40.02	cfs
Discharge Full	37.21	cfs
Slope Full	0.006227	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-8
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.388000	ft/ft
Diameter	24	in
Discharge	13.22	cfs

Results		
Depth	0.58	ft
Flow Area	0.75	ft²
Wetted Perimeter	2.26	ft
Top Width	1.81	ft
Critical Depth	1.31	ft
Percent Full	28.8	%
Critical Slope	0.021657	ft/ft
Velocity	17.69	ft/s
Velocity Head	4.86	ft
Specific Energy	5.44	ft
Froude Number	4.85	
Maximum Discharge	78.82	cfs
Discharge Full	73.27	cfs
Slope Full	0.012631	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-9
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.057 000	ft/ft
Diameter	18	in
Discharge	1.15	cfs

Results		
Depth	0.30	ft
Flow Area	0.25	ft²
Wetted Perimeter	1.39	ft
Top Width	1.20	ft
Critical Depth	0.40	ft
Percent Full	20.1	%
Critical Slope	0.018135	ft/ft
Velocity	4.55	ft/s
Velocity Head	0.32	ft
Specific Energy	0.62	ft
Froude Number	1.75	
Maximum Discharge	14.03	cfs
Discharge Full	13.04	cfs
Slope Full	0.000443	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation
Worksheet

Project Description	
Worksheet	DC-10
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.142500	ft/ft
Diameter	18	in
Discharge	1.94	cfs

Results		
Depth	0.31	ft
Flow Area	0.26	ft²
Wetted Perimeter	1.42	ft
Top Width	1.22	ft
Critical Depth	0.52	ft
Percent Full	20.7	%
Critical Slope	0.018269	ft/ft
Velocity	7.33	ft/s
Velocity Head	0.83	ft
Specific Energy	1.15	ft
Froude Number	2.77	
Maximum Discharge	22.18	cfs
Discharge Full	20.62	cfs
Slope Full	0.001262	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-11
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.025
Slope	0.046000 ft/ft
Diameter	18 in
Discharge	2.80 cfs

Results	
Depth	0.50 ft
Flow Area	0.51 ft²
Wetted Perimeter	1.84 ft
Top Width	1.41 ft
Critical Depth	0.64 ft
Percent Full	33.3 %
Critical Slope	0.018804 ft/ft
Velocity	5.44 ft/s
Velocity Head	0.46 ft
Specific Energy	0.96 ft
Froude Number	1.59
Maximum Discharge	12.60 cfs
Discharge Full	11.71 cfs
Slope Full	0.002628 ft/ft
Flow Type	Supercritical

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-12
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.040 000	ft/ft
Diameter	18	in
Discharge	3.73	cfs

Results		
Depth	0.60	ft
Flow Area	0.67	ft²
Wetted Perimeter	2.06	ft
Top Width	1.47	ft
Critical Depth	0.74	ft
Percent Full	40.3	%
Critical Slope	0.019705	ft/ft
Velocity	5.60	ft/s
Velocity Head	0.49	ft
Specific Energy	1.09	ft
Froude Number	1.47	
Maximum Discharge	11.75	cfs
Discharge Full	10.92	cfs
Slope Full	0.004664	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation
Worksheet

Project Description	
Worksheet	DC-12
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.033	ft/ft
	300	
Diameter	24	in
Discharge	14.50	cfs

Results		
Depth	1.20	ft
Flow Area	1.98	ft^2
Wetted Perimeter	3.55	ft
Top Width	1.96	ft
Critical Depth	1.37	ft
Percent Full	60.2	%
Critical Slope	0.022857	ft/ft
Velocity	7.34	ft/s
Velocity Head	0.84	ft
Specific Energy	2.04	ft
Froude Number	1.29	
Maximum Discharge	23.09	cfs
Discharge Full	21.47	cfs
Slope Full	0.015195	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-14
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.033 300	ft/ft
Diameter	18	in
Discharge	1.34	cfs

Results		
Depth	0.37	ft
Flow Area	0.34	ft²
Wetted Perimeter	1.56	ft
Top Width	1.29	ft
Critical Depth	0.43	ft
Percent Full	24.8	%
Critical Slope	0.018114	ft/ft
Velocity	3.93	ft/s
Velocity Head	0.24	ft
Specific Energy	0.61	ft
Froude Number	1.35	
Maximum Discharge	10.72	cfs
Discharge Full	9.97	cfs
Slope Full	0.000602	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation
Worksheet

Project Description	
Worksheet	DC-15
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.033 300	ft/ft
Diameter	18	in
Discharge	0.19	cfs

Results		
Depth	0.14	ft
Flow Area	0.09	ft²
Wetted Perimeter	0.94	ft
Top Width	0.88	ft
Critical Depth	0.16	ft
Percent Full	9.6	%
Critical Slope	0.020905	ft/ft
Velocity	2.20	ft/s
Velocity Head	0.08	ft
Specific Energy	0.22	ft
Froude Number	1.24	
Maximum Discharge	10.72	cfs
Discharge Full	9.97	cfs
Slope Full	0.000012	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation
Worksheet

Project Description	
Worksheet	DC-16
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.025
Slope	0.033 ft/ft 300
Diameter	18 in
Discharge	0.53 cfs

Results	
Depth	0.24 ft
Flow Area	0.18 ft²
Wetted Perimeter	1.22 ft
Top Width	1.09 ft
Critical Depth	0.27 ft
Percent Full	15.7 %
Critical Slope	0.018890 ft/ft
Velocity	2.99 ft/s
Velocity Head	0.14 ft
Specific Energy	0.37 ft
Froude Number	1.31
Maximum Discharge	10.72 cfs
Discharge Full	9.97 cfs
Slope Full	0.000094 ft/ft
Flow Type	Supercritical

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-17
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.040 000	ft/ft
Diameter	18	in
Discharge	2.25	cfs

Results		
Depth	0.46	ft
Flow Area	0.46	ft²
Wetted Perimeter	1.76	ft
Top Width	1.38	ft
Critical Depth	0.57	ft
Percent Full	30.8	%
Critical Slope	0.018367	ft/ft
Velocity	4.87	ft/s
Velocity Head	0.37	ft
Specific Energy	0.83	ft
Froude Number	1.49	
Maximum Discharge	11.75	cfs
Discharge Full	10.92	cfs
Slope Full	0.001697	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-18
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.025
Slope	0.057 ft/ft 000
Diameter	18 in
Discharge	0.10 cfs

Results	
Depth	0.09 ft
Flow Area	0.05 ft^2
Wetted Perimeter	0.76 ft
Top Width	0.72 ft
Critical Depth	0.12 ft
Percent Full	6.2 %
Critical Slope	0.022852 ft/ft
Velocity	2.19 ft/s
Velocity Head	0.07 ft
Specific Energy	0.17 ft
Froude Number	1.53
Maximum Discharge	14.03 cfs
Discharge Full	13.04 cfs
Slope Full	0.000003 ft/ft
Flow Type	Supercritical

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	DC-19
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.025 000	ft/ft
Diameter	18	in
Discharge	1.11	cfs

Results		
Depth	0.36	ft
Flow Area	0.33	ft²
Wetted Perimeter	1.54	ft
Top Width	1.29	ft
Critical Depth	0.39	ft
Percent Full	24.2	%
Critical Slope	0.018124	ft/ft
Velocity	3.36	ft/s
Velocity Head	0.18	ft
Specific Energy	0.54	ft
Froude Number	1.17	
Maximum Discharge	9.29	cfs
Discharge Full	8.64	cfs
Slope Full	0.000413	ft/ft
Flow Type	Supercritical	

Flow Velocity Calculation Worksheet

Project Description	
Worksheet	UC-1
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.045 800	ft/ft
Diameter	60	in
Discharge	52.32	cfs

Results		
Depth	1.44	ft
Flow Area	4.67	ft²
Wetted Perimeter	5.66	ft
Top Width	4.53	ft
Critical Depth	2.03	ft
Percent Full	28.8	%
Critical Slope	0.012470	ft/ft
Velocity	11.19	ft/s
Velocity Head	1.95	ft
Specific Energy	3.39	ft
Froude Number	1.94	
Maximum Discharge	311.76	cfs
Discharge Full	289.82	cfs
Slope Full	0.001493	ft/ft
Flow Type	Supercritical	

Lila Canyon Mine

APPENDIX 1 - Culvert Outlet Rip-Rap Apron Flow Velocity Calculations

Lila Canyon
Worksheet for Circular Channel

Project Description	
Worksheet	UC-1 - Outlet Velocity - (100/6)
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.00500	ft/ft
Diameter	48	in
Discharge	52.32	cfs

Results		
Depth	3.25	ft
Flow Area	10.92	ft^2
Wetted Perimeter	8.97	ft
Top Width	3.13	ft
Critical Depth	2.17	ft
Percent Full	81.1	%
Critical Slope	0.014895	ft/ft
Velocity	4.79	ft/s
Velocity Head	0.36	ft
Specific Energy	3.60	ft
Froude Number	0.45	
Maximum Discharge	56.81	cfs
Discharge Full	52.81	cfs
Slope Full	0.004907	ft/ft
Flow Type	Subcritical	

Lila Canyon
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	UC-1 - Apron Outlet - (100/6)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Slope	0.001000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	9.00	ft
Discharge	52.32	cfs

Results		
Depth	2.49	ft
Flow Area	34.79	ft^2
Wetted Perimeter	20.13	ft
Top Width	18.96	ft
Critical Depth	0.94	ft
Critical Slope	0.033208	ft/ft
Velocity	1.50	ft/s
Velocity Head	0.04	ft
Specific Energy	2.52	ft
Froude Number	0.20	
Flow Type	Subcritical	

Appendix 8-1

Reclamation Cost Estimates

Bonding Calculations
Horse Canyon MineC/007/013
Lila Canyon Section

Bond Summary

Direct Costs

Subtotal Demolition and Removal	$525,849.00	
Subtotal Backfilling and Grading	$417,838.00	
Subtotal Revegetation	$340,586.00	
Direct Costs	$1,284,273.00	
Indirect Costs		
Mob/Demob	$128,427.00	10.0%
Contingency	$64,214.00	5.0%
Engineering Redesign	$32,107.00	2.5%
Main Office Expense	$87,331.00	6.8%
Project Mainagement Fee	$32,107.00	2.5%
Subtotal Indirect Costs	$344,186.00	26.8%
Total Cost	$1,628,459.00	
Escalation factor		0.0444
Number of years		3
Escalation	$226,684.00	
Reclamation Cost	$1,855,143.00	
Bond Amount (rounded to nearest $1,000) 2008 Dollars	$1,855,000.00	
Bond Posted Up to May 2007	$1,686,000.00	
Difference Between Cost Estimate and Bond	-$169,000.00	
Percent Difference	-9.11%	

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Office Bathhouse																			$77,194
	Shop Warehouse																			$90,803
	Security Shack																			$505
	Mine Substation																			$13,487
	Underground Power Lines																			left in place
	Water Treatment Plant																			$1,848
	Potable Water Tank																			1100
	Process Water Tank																			1100
	Sewer Tank																			$1,421
	Drain Field																			left in place
	Ventilation Fan																			$52,340
	Conveyor Tunnels to Coal Stockpile																			28814
	Conveyor ROM Stockpile to Crusher																			10209
	Conveyor Crusher to Loudout Bin																			$7,044
	Conveyor Loudout Bin Truck Loadout																			$444
	Reclaim Escape Tunnel Fan Fan House																			16256
	ConveyorStoragePileStakingTube																			8765
	Crusher Screen Plant																			3922
	Truck Scale to Loadout																			$6,201
	Coal Storage Bin																			$3,254
	Guard Rail																			18088
	Underground Pipes																			Left in Place
	Chain Link Fence																			$4,380
	Mine Facilities Rd Truck Loadout Rd																			$54,159
	Office Bathhouse Warehouse Parking																			$91,896
	Mine Parking																			$22,989
	Fuel Tanks																			$4,368
	Powder and Cap Magazine																			$3,220
	Culverts																			2042
	Total																			$525,849

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Office Bathhouse																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF	150	100	15								FT		225000	CF	45000
	Structure's Vol. Demolished																0.3	2500	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		600	ton	21000
	Subtotal																			66000
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY	150	100	1								FT		556	CY	2207
	Concrete's Vol. Demolished																1.3	723	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													723	CY	1005
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													723	CY	2487
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													723	CY	5495
	Subtotal																			11194
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			77194

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Shop Warehouse																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF	150	100	20								FT		300000	CF	60000
	Structure's Vol. Demolished																0.3	3333	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		800	ton	28000
	Subtotal																			88000
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY	150	100	0.25								FT		139	CY	552
	Concrete's Vol. Demolished																1.3	181	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													181	CY	252
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													181	CY	623
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													181	CY	1376
	Subtotal																			2803
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			90803

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Security Shack																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF	20	10	8								FT		1600	CF	320
	Structure's Vol. Demolished																0.3	18	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		4	ton	140
	Subtotal																			460
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY	20	10	0.25								FT		2	CY	8
	Concrete's Vol. Demolished																1.3	3	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													3	CY	4
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													3	CY	10
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													3	CY	23
	Subtotal																			45
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			505

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Mine Substation																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost	Mechanical equipment heavy	15055 300 3600	805	/ton							4			4	ton		16	ton	12880
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			12880
	Equipment 's Disposal Cost	Chain link remove 8'-10'	02220 220 1700	2.92	/LF	160										FT		160	FT	467
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			467
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY	20	20	0.5							4	FT		7	CY	28
	Concrete's Vol. Demolished																1.3	9	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													9	CY	13
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													9	CY	31
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													9	CY	68
	Subtotal																			140
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			13487

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Underground Power Lines																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			left in place

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Water Treatment Plant																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF						1800					CF		1800	CF	360
	Structure's Vol. Demolished																0.3	20	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		5	ton	175
	Subtotal																			535
	Equipment 's Disposal Cost																			
	Dismantling Cost	3000 gal. to 5000 gal. tank	02115 200 0110	545	Ea.										1	EA		1	EA	545
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs	3000 gal. to 5000 gal. tank	02115 200 1023	690	Ea.										1	EA		1	EA	690
	Subtotal																			1235
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY	15	15	0.5								FT		4	CY	16
	Concrete's Vol. Demolished																1.3	5	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													5	CY	7
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													5	CY	17
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													5	CY	38
	Subtotal																			78
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			1848

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Potable Water Tank																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF			20	15							FT		3534	CF	707
	Structure's Vol. Demolished																0.3	39	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		9	ton	315
	Subtotal																			1022
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY	15	15	0.5								FT		4	CY	16
	Concrete's Vol. Demolished																1.3	5	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													5	CY	7
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													5	CY	17
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													5	CY	38
	Subtotal																			78
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			1100

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Process Water Tank																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF			20	15							FT		3534	CF	707
	Structure's Vol. Demolished																0.3	39	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		9	ton	315
	Subtotal																			1022
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY	15	15	0.5								FT		4	CY	16
	Concrete's Vol. Demolished																1.3	5	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													5	CY	7
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													5	CY	17
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													5	CY	38
	Subtotal																			78
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			1100

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Sewer Tank																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Remove Tank	3000 gal. to 5000 gal. tank	02115 200 0110	545	Ea.										1	EA		1	EA	545
	Remove Sludge	3000 gal. to 5000 gal. tank	02115 200 0300	186	Ea.										1	EA		1	EA	186
	Disposal Costs	3000 gal. to 5000 gal. tank	02115 200 1023	690	Ea.										1	EA		1	EA	690
	Subtotal																			1421
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			1421

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Drain Field																			
	Structure's Demolition Cost	will remain in place at reclamation																		
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			left in place

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Ventilation Fan																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost	Mechanical equipment heavy	15055 300 3600	805	/ton							10			4	ton		40	ton	32200
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			32200
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs	Helicopter	Willow Creek 1	2000	/HR									10		HR		10	HR	20000
	Disposal Costs																			
	Subtotal																			20000
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY	20	20	0.5								FT		7	CY	28
	Concrete's Vol. Demolished																1.3	9	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													9	CY	13
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													9	CY	31
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													9	CY	68
	Subtotal																			140
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			52340

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Conveyor Tunnels to Coal Stockpile																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF	810	6	20								FT		97200	CF	19440
	Structure's Vol. Demolished																0.3	1080	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		259	ton	9065
	Subtotal																			28505
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY						15							15	CY	60
	Concrete's Vol. Demolished																1.3	20	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													20	CY	28
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													20	CY	69
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													20	CY	152
	Subtotal																			309
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			28814

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Conveyor ROM Stockpile to Crusher																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF	675	5	10								FT		33750	CF	6750
	Structure's Vol. Demolished																0.3	375	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		90	ton	3150
	Subtotal																			9900
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY						15							15	CY	60
	Concrete's Vol. Demolished																1.3	20	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													20	CY	28
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													20	CY	69
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													20	CY	152
	Subtotal																			309
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			10209

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Conveyor Crusher to Loudout Bin																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF	230	5	20								FT		23000	CF	4600
	Structure's Vol. Demolished																0.3	256	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		61	ton	2135
	Subtotal																			6735
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY						15							15	CY	60
	Concrete's Vol. Demolished																1.3	20	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													20	CY	28
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													20	CY	69
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													20	CY	152
	Subtotal																			309
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			7044

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Conveyor Loudout Bin Truck Loadout																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF	5	5	20								FT		500	CF	100
	Structure's Vol. Demolished																0.3	6	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		1	ton	35
	Subtotal																			135
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY						15							15	CY	60
	Concrete's Vol. Demolished																1.3	20	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													20	CY	28
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													20	CY	69
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													20	CY	152
	Subtotal																			309
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			444

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Reclaim Escape Tunnel Fan Fan House																			
	Currugated Steel	Steel Bld. Large	02220 110 0012	0.2	/CF						26880					CF		26880	CF	5376
	Escape Tunnel	Steel Bld. Large	02220 110 0012	0.2	/CF						1257					CF		1257	CF	251
	Fan	Steel Bld. Large	02220 110 0012	0.2	/CF						64					CF		64	CF	13
	Fan House	Steel Bld. Large	02220 110 0012	0.2	/CF						512					CF		512	CF	102
	Structure's Vol. Demolished																0.3	319	CF	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		77	ton	2695
	Subtotal																			8437
	Excavation and Backfill																			
	Reclaim Tunnel	Excavation Bulk Bank 2 CY (322BL)	02315 424 0260	1.7	/CY	350	14	10								FT		1815	CY	3086
	Reclaim Tunnel	Backfill Trench Mininal Haul 2 1/4 CY	02315 610 3080	1.53	/CY													1815	CY	2777
	Escape Tunnel	Excavation Bulk Bank 2 CY (322BL)	02315 424 0260	1.7	/CY	325	4	10								FT		481	CY	818
	Escape Tunnel	Backfill Trench Mininal Haul 2 1/4 CY	02315 610 3080	1.53	/CY													481	CY	736
	Subtotal																			7417
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY						20							20	CY	79
	Concrete's Vol. Demolished																1.3	26	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													26	CY	36
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													26	CY	89
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													26	CY	198
	Subtotal																			402
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			16256

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	ConveyorStoragePileStakingTube																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF			80	20							FT		25133	CF	5027
	Structure's Vol. Demolished																0.3	279	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		67	ton	2345
	Subtotal																			7372
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY	25	25	3								FT		69	CY	274
	Concrete's Vol. Demolished																1.3	90	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													90	CY	125
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													90	CY	310
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													90	CY	684
	Subtotal																			1393
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			8765

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Crusher Screen Plant																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF						12000					CF		12000	CF	2400
	Structure's Vol. Demolished																0.3	133	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		32	ton	1120
	Subtotal																			3520
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY						20							20	CY	79
	Concrete's Vol. Demolished																1.3	26	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													26	CY	36
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													26	CY	89
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													26	CY	198
	Subtotal																			402
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			3922

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Truck Scale to Loadout																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF						18850					CF		18850	CF	3770
	Structure's Vol. Demolished																0.3	209	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		50	ton	1750
	Subtotal																			5520
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY						34							34	CY	135
	Concrete's Vol. Demolished																1.3	44	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													44	CY	61
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													44	CY	151
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													44	CY	334
	Subtotal																			681
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			6201

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Coal Storage Bin																			
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF						10000					CF		10000	CF	2000
	Structure's Vol. Demolished																0.3	111	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel	ECDC	ECDC	35	/TON								480			lb/cf		27	ton	945
	Subtotal																			2945
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.97	/CY						15							15	CY	60
	Concrete's Vol. Demolished																1.3	20	CY	
	Loading Cost	Front end loader 3 CY	02315 424 1300	1.39	/CY													20	CY	28
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r	02315 490 0320	3.44	/CY													20	CY	69
	Disposal Costs	On site disposal	02220 240 5550	7.6	/CY													20	CY	152
	Subtotal																			309
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			3254

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Guard Rail																			
	Structure's Demolition Cost	Guiderail remove	02220 240 0800	11.9	LF	1520										FT		1520	FT	18088
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			18088
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			18088

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Underground Pipes	will remain in place at reclamation																		
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			Left in Place

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Chain Link Fence																			
	Structure's Demolition Cost	Chain link remove 8'-10'	02220 220 1700	2.92	/LF	1500										FT		1500	FT	4380
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			4380
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			4380

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Mine Facilities Rd Truck Loadout Rd																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Facilities Road																			
	Asphalt Demolition																			
	Demolition Cost	Pavement Removal 4-6"	02220 250 5050	6.55	/SY	1750	24									SY		4667	SY	30569
	Asphalt's Vol. Demolished							4.00								IN	1.3	674	CY	
	Loading Cost																			
	Transportation Cost	16.5 CY Dump Trailer 10 mi. rnd. trip	02315 490 1120	9.75	/CY															
	Disposal Costs	ECDC	ECDC	35	/TON								1			CY/Ton		674	CY	23590
	Subtotal																			54159
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Total																			54159

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Office Bathhouse Warehouse Parking																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Office Area																			
	Asphalt Demolition																			
	Demolition Cost	Pavement Removal 4-6"	02220 250 5050	6.55	/SY	475	150									SY		7917	SY	51856
	Asphalt's Vol. Demolished							4.00								IN	1.3	1144	CY	
	Loading Cost																			
	Transportation Cost	16.5 CY Dump Trailer 10 mi. rnd. trip	02315 490 1120	9.75	/CY															
	Disposal Costs	ECDC	ECDC	35	/TON								1			CY/Ton		1144	CY	40040
	Subtotal																			91896
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Total																			91896

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Mine Parking																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Parking Lot																			
	Asphalt Demolition																			
	Demolition Cost	Pavement Removal 4-6"	02220 250 5050	6.55	/SY	100	200									SY		2222	SY	14554
	Asphalt's Vol. Demolished							3.00								IN	1.3	241	CY	
	Loading Cost																			
	Transportation Cost	16.5 CY Dump Trailer 10 mi. rnd. trip	02315 490 1120	9.75	/CY															
	Disposal Costs	ECDC	ECDC	35	/TON								1			CY/Ton		241	CY	8435
	Subtotal																			22989
	Total																			22989

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Fuel Tanks																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Removal Tanks	3000 gal. to 5000 gal. tank	02115 200 0110	580	Ea.										3	EA		3	EA	1740
	Remove sludge water products	3000 gal. to 5000 gal. tank	02115 200 0300	186	Ea.										3	EA		3	EA	558
	Haul tank recycle center	3000 gal. to 5000 gal. tank	02115 200 1023	690	Ea.										3	EA		3	EA	2070
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			4368
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			4368

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Powder and Cap Magazine																			
	Structure's Demolition Cost	Mechanical equipment heavy	15055 300 3600	805	/ton							4				TON		4	TON	3220
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			3220
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			3220

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Culverts																			
	DC-5	Excavation Bulk Bank 2 CY (322BL)	02315 424 0260	1.7	/CY	40	1.5	3								FT		7	CY	12
	DC-5	Backfill Trench Mininal Haul 2 1/4 CY	02315 610 3080	1.53	/CY	40	1.5	3								FT		7	CY	11
	DC-6	Excavation Bulk Bank 2 CY (322BL)	02315 424 0260	1.7	/CY	60	2	3								FT		13	CY	22
	DC-6	Backfill Trench Mininal Haul 2 1/4 CY	02315 610 3080	1.53	/CY	60	2	3								FT		13	CY	20
	DC-7	Excavation Bulk Bank 2 CY (322BL)	02315 424 0260	1.7	/CY	40	2	3								FT		9	CY	15
	DC-7	Backfill Trench Mininal Haul 2 1/4 CY	02315 610 3080	1.53	/CY	40	2	3								FT		9	CY	14
	DC-8	Excavation Bulk Bank 2 CY (322BL)	02315 424 0260	1.7	/CY	40	1.5	3								FT		7	CY	12
	DC-8	Backfill Trench Mininal Haul 2 1/4 CY	02315 610 3080	1.53	/CY	40	1.5	3								FT		7	CY	11
	DC-9	Excavation Bulk Bank 2 CY (322BL)	02315 424 0260	1.7	/CY	40	1.5	3								FT		7	CY	12
	DC-9	Backfill Trench Mininal Haul 2 1/4 CY	02315 610 3080	1.53	/CY	40	1.5	3								FT		7	CY	11
	UC-1	Excavation Bulk Bank 2 CY (322BL)	02315 424 0260	1.7	/CY	530	5	6								FT		589	CY	1001
	UC-1	Backfill Trench Mininal Haul 2 1/4 CY	02315 610 3080	1.53	/CY	530	5	6								FT		589	CY	901
	Subtotal																			2042
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			2042

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			

T	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Load and Haul Backfill Material															140052
Load and Haul Topsoil															211166
Support															66620
Total															417838

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Horse Canyon Mine Lila Canyon Project															
Grading															
Load and Haul Backfill Material															
631G (9-51) (2nd04)	19145	19145	0.1	52	267.14	3	801.42	$/HR	28928	CY	393	CY/HR	73.6	HR	58985
D9R Semi-U EROPS (9-54) (2H04)	17115	72.3	0.1	52	238.5	1	238.5	$/HR					73.6	HR	17554
Subtotal															76539
Spread and Compact Material															
Assume 4 passes 8 mph 10 in. lift															
D9R Semi-U EROPS (9-54) (2H04)	17115	72.3	0.1	52	238.5	1	238.5	$/HR					73.6	HR	17554
825G((6-13) (4Q03))	12825	43.5	0.1	47.15	175.16	1	175.16	$/HR					73.6	HR	12892
Subtotal															30446
Upper Road Area															
769D (20-11) (1Q04)	10520	40.4	0.1	42	152.19	1	152.19	$/HR	5000	CY	289	CY/HR	17.3	HR	2633
988G EROPS (9-38) (3Q03)	9010	40.05	0.1	52	152.37	4	609.48	$/HR					17.3	HR	10544
CAT 325BL (10-21)(2nd04)	9170	35.55	0.1	52	148.42	1	148.42	$/HR					17.3	HR	13177
D9R Semi-U EROPS (9-54) (2H04)	17115	72.3	0.1	52	238.5	1	238.5	$/HR	5000		120	CY/HR	41.7	HR	9945
															9945
Subtotal															19890
Total															140052

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Horse Canyon Mine Lila Canyon Project															
Grading															
Load and Haul Topsoil															
631G (9-51) (2nd04)	19145	19145	0.1	52	267.14	3	801.42	$/HR	56000	CY	393	CY/HR	142.5	HR	114202
D9R Semi-U EROPS (9-54) (2H04)	17115	72.3	0.1	52	238.5	1	238.5	$/HR					142.5	HR	33986
Subtotal															148188
769D (20-11) (1Q04)	10520	40.4	0.1	42	152.19	1	152.19	$/HR	10000	CY	289	CY/HR	34.6	HR	5266
988G EROPS (9-38) (3Q03)	9010	40.05	0.1	52	152.37	4	609.48	$/HR					34.6	HR	21088
CAT 325BL (10-21)(2nd04)	9170	35.55	0.1	52	148.42	1	148.42	$/HR					34.6	HR	5135
Subtotal															31489
															62978
Total															211166

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Horse Canyon Mine Lila Canyon Project Grading															
Support															
5,000 gal H2O truck Diesel (20-17) (1Q04)	4725	28.05	0.1	42	102.39	1	102.39	$/HR					384.2	HR	39338
Pickup Truck Crew 4x4 1 ton (20-17) (2N04)	820	7.8	0.1	0	13.71	1	13.71	$/HR					384.2	HR	5267
Foreman Average, Outside					57.3	1	57.3	$/HR					384.2	HR	22015
															66620
Total															66620

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Vegetation																			
	Ground Preparation																			
	See Chapter 5 page 95-96 Sec. 553.230																			
	Soil to be ripped	75 HP Dozerw/scarifiers	M029107103100	3.87	MSF					34						AC		1481	MSF	5731
	Gouging/Pocking																			
	Assume 340 CY/AC	Excavation Bulk Bank 2 CY (322BL)	M023154240260	1.7	/CY					34						AC		11560	CY	19652
	Subtotal																			25383
	Seeding																			
	Fertilize Material	Fertilizer Hyrdor Spread Mat. Only	Reveg006	8.71	/MSF					34						AC		1481	MSF	12900
	Fertilize Application	Hydro Spreader (equip. & labor) B-81 80MS	Reveg002	19.13	/MSF					34						AC		1481	MSF	28332
	Seeding Materials	Grasses for Lila Canyon	Lila07131	140.5	/AC					34						AC		34	AC	4777
	Seeding Materials	Forbs for Lila Canyon	Lila07132	92.2	/AC					34						AC		34	AC	3135
	Seeding Materials	Shrubs for Lila Canyon	Lila07133	106.45	/AC					34						AC		34	AC	3619
	Seeding Application	Hydro Spreader (equip. & labor) B-81 80MS	Reveg002	19.13	/MSF					34						AC		1481	MSF	28332
	Mulch Materials	Hay 1" material only 029105000250	Reveg001	68	/MSF					34						AC		1481	MSF	100708
	Mulch Application	Hydro Spreader (equip. & labor) B-81 80MS	Reveg002	19.13	/MSF					34						AC		1481	MSF	28332
	Subtotal																			210135
	Reseeding																			105068
	Assume 50% reseeding rate																			
	Subtotal																			105068
	Total																			340586